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ABSTRACT

One of two individualized courses included in an appliance repair curriculum, this course is designed to prepare students to operate, diagnose malfunctions, repair, and service motor operated appliances. The course is comprised of seven units: (1) Mixers and Blenders, (2) Vacuum Cleaners and Floor Polishers, (3) Washing Machines, (4) Garbage Disposers, (5) Clothes Dryers, (6) Dishwashers, and (7) Compactors. Each unit begins with a Unit Learning Experience Guide that gives directions for unit completion. The remainder of each unit consists of Learning Activity Packages (LAP) that provide specific information for completion of a learning activity. Each LAP is comprised of the following parts: objective, evaluation procedure, resources, procedure, supplemental sheets, study guide, and a LAP test with answers. The course is preceded by a pretest which is designed to direct the student to units and performance activities. (LRA)

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ED197139

MOUNTAIN PLAINS LEARNING EXPERIENCE GUIDE:

Appliance Repair. Course: Motor-Operated Appliances.

CE 027 767

U S DEPARTMENT OF HEALTH,
EDUCATION & WELFARE
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Mountain-Plains Education &
Economic Development
Program, Inc.
Glasgow AFB, Montana 59231

Learning Experience Guide

COURSE: MOTOR-OPERATED APPLIANCES

DESCRIPTION:

This course is about motor-operated minor and major appliances. Minor motor-operated appliances are the portable type: food blenders, food mixers, vacuum cleaners, and floor polishers. These are included to provide simple application of motor-operated appliances. The major motor-operated appliances are those that the consumer generally has repaired. Therefore, the emphasis is on the major electric and gas appliances. Part of the troubleshooting servicing and repair is on actual malfunctioning appliances.

Support to this course includes the theory of simple and complex DC circuits, simple AC circuits and fundamentals of electric motors.

OBJECTIVES:

Operate, diagnose malfunctions, repair and service motor-operated appliances, using appropriate tools, equipment, service manuals and procedures.

PREREQUISITES:

Course: 76.01 "Heater-type Appliances"
Three units from the Course: DC Circuits; three units from the Course: AC Circuits; and one unit from the Course: Electric Motor Repair are prerequisite support to certain units in their Course: Motor Operated Appliances. The prerequisite units are identified in the Prerequisites section of the particular unit Learning Experience Guide (LEG) for which it supports.

RATIONALE:

Most of the repair and servicing is performed on larger motor-operated appliances. The appliance repair person applies the practical skills of operating, identifying of components, troubleshooting, ordering parts, servicing and repairing to the major motor-operated appliances. The procedures and knowledges needed for application of the skills are therefore necessary.

Principal Author(s): T. Ziller

RESOURCES:

A resource list is attached.

GENERAL INSTRUCTIONS:

This course has seven units. Each unit has a Unit Learning Experience Guide (LEG) that gives directions for unit completion. Each unit consists of Learning Activity Packages (LAPs) that provide specific information for completion of a learning activity. Pretesting results direct the student to units and performance activities.

The general procedure for this course is as follows:

(1) Read the assigned unit LEG for this course.
(2) Begin and complete the first assigned LAP.
  a. Take and score the LAP test.
  b. Turn in the LAP test answer sheet.
  c. Determine the reason for any missed items on the LAP test.
  d. Proceed to the next assigned LAP in the unit.
  e. Complete all required LAPs for the unit by following steps (a) through (d).
(3) Take the unit tests as described in the Unit LEG "Evaluation Procedures".
(4) Proceed to the next assigned unit in this course.
(5) Follow steps 1 through 4 for all required units for this course.
(6) Proceed to the next assigned course in your "Appliance Serviceman" Program.

You will work independently unless directed to do otherwise. When questions or problems arise, you are expected to discuss them with the instructor. At all times remember to follow correct safety procedures during the performance activity.

UNIT TITLES:

.01 Mixers and Blenders
.02 Vacuum Cleaners and Floor Polishers
.03 Washing Machines
.04 Garbage Disposers
.05 Clothes Dryers
.06 Dishwashers
.07 Compactors

EVALUATION PROCEDURE:

Course evaluation is by pre and post testing using a multiple-choice type of test.

In this course, the course test is used as a pretest to determine which units, if any, the student may be able to validate. The student is considered validated for a particular unit if 4 out of 5 items are correctly answered for each LAP part on the course pretest and that particular unit does not have a performance test requirement.

For those units with performance test requirements, the student must also satisfactorily complete the performance test to validate that unit. Unit performance tests validation procedures are given in the "Evaluation Procedure" section of the unit Learning Experience Guide (LEG).

The course test will also be taken by the student as a post test to determine any changes resulting from taking all or part of the course.

FOLLOW-THROUGH:

When you finish reading this course guide, you are ready for the first assigned unit in the course. Obtain the LEG for that unit.

RESOURCE LIST

Printed Materials

1. Appliance Service Manuals for appliances used in the program.
2. Catalogs, appliance supply (assortment).
3. Home Appliance Servicing. Second Edition, Edwin P. Anderson, Theodore Audel and Company, 1965.
4. Manufacturer's specification sheets.
5. Order forms.
6. Work order forms.

Audio/Visuals

none

Equipment

1. Blender, food, electric.
2. Cleaner, vacuum, electric.
3. Compactor, electric, automatic.
4. Dishwasher, automatic.
5. Disposer, garbage.
6. Dryer, clothes (electric, automatic).
7. Dryer, clothes (gas, automatic).
8. Mixer, food, electric.
9. Polisher, floor, electric.
10. Test equipment: Amprobe (RS-3 Rotary Meter B-A)
    - Meter, volt-ohm
11. Tools:
    - Box, utility
    - Chisels, (1/2" and 5/8")
    - Cutters, diagonal
    - Gun, soldering (100-140 watt)
    - Hammer, ball peen (12 oz.)
    - Kit, solderless terminal
    - Knife, electricians
    - Level, aluminum (18")
    - Nut driver set
    - Pliers, channel-lock (10")
    - Plier, long nose
    - Plier, slip joint
    - Plier, vise grip (size 7")
    - Puncher (3/16", 3/8" and 5/32")
    - Screwdriver, blade (set)
    - Screwdriver, Phillips (set)
    - Tape, steel measuring (12 ft.)
    - Wrench, adjustable
    - Wrench, combination (set)
    - Wrench, hex and spline (kit)
12. Washer, clothes, automatic.

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Glasgow AFB, Montana 59231

Learning Experience Guide

UNIT: VACUUM CLEANERS AND FLOOR POLISHERS

RATIONALE:

Every appliance service person is expected to service and repair various types of vacuum cleaners and floor polishers. An effective service person must understand how a particular appliance works. It takes a great deal of skill and understanding to be proficient serviceman.

PREREQUISITES:

Unit:	77.01.09	Mutual Induction and RL Circuits
Unit:	76.02.01	Mixers and Blenders

OBJECTIVES:

Operate, disassemble, diagnose malfunctions, repair, service or replace component parts, and reassemble a vacuum cleaner and a floor polisher using service manuals and tools.

Identify vacuum cleaner and floor polisher component parts and characteristics of operation. Identify procedures for diagnosis, repair and service of vacuum cleaners and floor polishers.

RESOURCES:

Printed Materials

Appliance Service Manuals for appliances used in the program.
Catalogs, appliance supply (assortment).
Home Appliance Servicing, Edwin P. Anderson, 2nd Edition, Theodore Audel and Company, Indianapolis, Indiana, 1965.
Order forms.
Work order forms.
Manufacturer's specification sheets.

Equipment

Cleaner, vacuum, electric.
Polisher, floor, electric.
Test Equipment: Amprobe (RS-3 Rotary Meter B-A).
Meter, Volt-ohm.

Principal Author(s): T. Ziller

Tools: Box, utility.
Chisels, (½" and 5/8").
Cutters, diagonal.
Gun, Soldering (100-140 watt).
Hammer, ball pein (12 oz.).

Kit, solderless terminal.
Knife, electricians.
Level, aluminum 18".

Nut driver set.
Pliers, channel-lock (10").
Plier, long nose.
Plier, slip joint.
Plier, vise grip (size 7").
Puncher (3/16", 3/8" & 5/32").

Screwdriver, blade (set).
Screwdriver, Phillips (set).
Tape, steel measuring (12 ft).
Wrench, adjustable.
Wrench, combination set.
Wrench, hex & spline (kit).

GENERAL INSTRUCTIONS:

This unit consists of eight Learning Activity Packages (LAPs). Each LAP will provide specific information for completion of a learning activity.

The general procedure for this unit is as follows:

(1) Read the first assigned Learning Activity Package (LAP).
(2) Begin and complete the first assigned LAP.
(3) Take and score the LAP test.
(4) Turn in the LAP test answer sheet.
(5) Determine the reason for any missed items on the LAP test.
(6) Proceed to and complete the next assigned LAP in the unit.
(7) Complete all required LAPs for the unit by following steps 3 through 6.
(8) Take the unit tests as described in the Unit LEG "Evaluation Procedures."
(9) Proceed to the next assigned unit.

PERFORMANCE ACTIVITIES:

.01 Operation of an Electric Vacuum Cleaner
.02 Disassembly of an Electric Vacuum Cleaner
.03 Diagnosis of Malfunctions in an Electric Vacuum Cleaner
.04 Repair, Service and Reassembly of an Electric Vacuum Cleaner
.05 Operation of an Electric Floor Polisher
.06 Disassembly of an Electric Floor Polisher
.07 Diagnosis of Malfunctions in an Electric Floor Polisher
.08 Repair, Service and Reassembly of an Electric Floor Polisher

EVALUATION PROCEDURE:

When pretesting:

1. The student takes the unit multiple-choice pretest.
2. Successful completion is 4 out of 5 items for each LAP part of the pretest.
3. The student then takes a unit performance test if the unit pretest was successfully completed.
4. Satisfactory completion of the performance test is meeting the criteria listed on the performance test.

When post testing:

1. The Student takes a multiple-choice unit post test and a unit performance test.
2. Successful unit completion is meeting the listed criteria for the performance test.

FOLLOW-THROUGH:

After reading this unit, obtain the LAP for the first assigned performance activity.

Student: ______________________ File Code: 76.02.02.00.A2-2

Date: ______________________ Date Published: 7/29/75

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UNIT PRETEST: VACUUM CLEANERS AND FLOOR POLISHERS

76.02.02.01.

1. The motor is connected in what relation to the suction-fan assembly on an upright vacuum cleaner?

   a. by slip clutch assembly.
   b. indirectly.
   c. by belt-and-pulley arrangement.
   d. directly.

2. A straight suction type vacuum cleaner depends for it's operation:

   a. upon the high velocity of air at its nozzle.
   b. its compact size.
   c. use of small nozzles.
   d. use of special attachments.

3. Air flow is created by what on a suction-type vacuum cleaner?

   a. by brush roller.
   b. by air from filter bag.
   c. by fans on the armature shaft.
   d. by a separate motor.

4. What part(s) in a vacuum cleaner makes it possible to pass electricity to the armature without using solid connections?

   a. armature windings.
   b. commutator and brush.
   c. bearings.
   d. brush assembly.

5. The vacuum cleaner armature assembly turns in a :

   a. magnetic field.
   b. vacuum housing
   c. electrical field.
   d. either direction.

MODEL P2MV2 PORTABLE VACUUM CLEANER

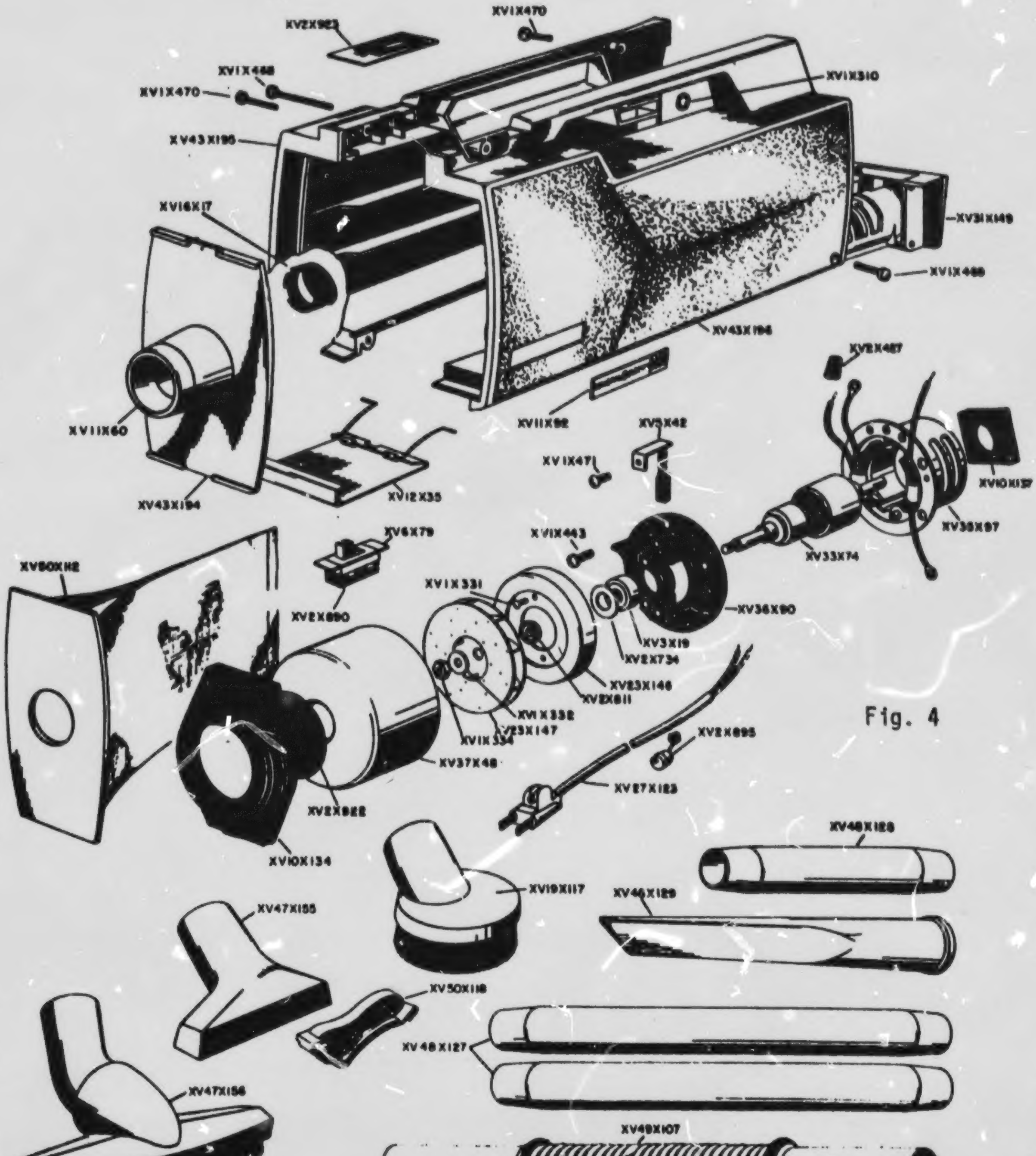
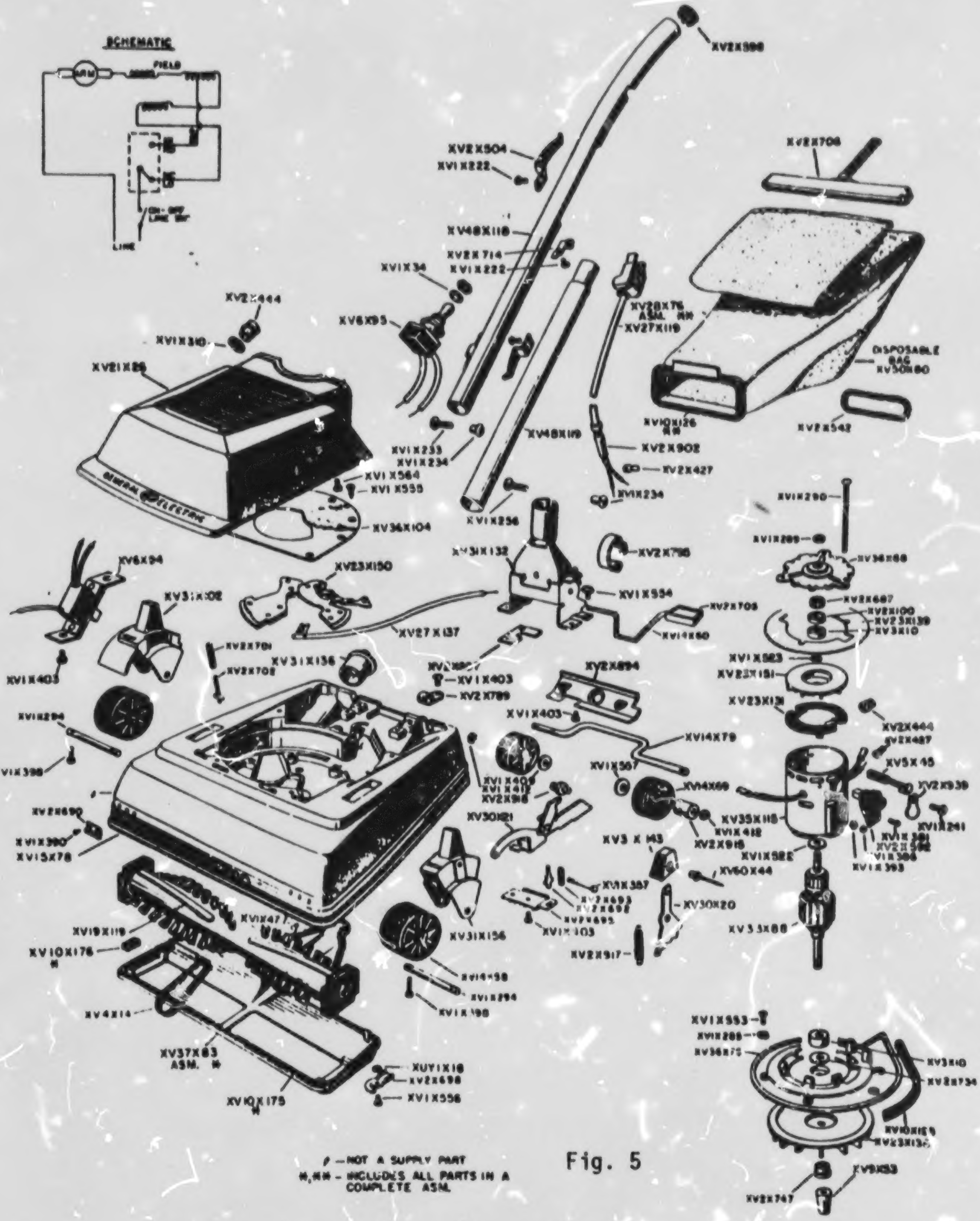

XV2X923
XV1X470
XV1X468
XV1X470
XV1X310
XV43X195
XV16X17
XV31X149
XV1X468
XV43X196
XV11X60
XV2X427
XV11X92
XV5X42
XV1X471
XV10X137
XV43X194
XV12X35
XV35X97
XV6X79
XV1X443
XV33X74
XV50X112
XV1X331
XV2X890
XV36X90
XV3X19
XV2X734
XV23X146
XV2X811
XV1X332
XV23X147
XV1X334
XV2X895
XV37X48
XV27X123
XV2X922
XV10X134
XV48X128
XV19X117
XV46X129
XV47X155
XV50X118
XV48X127
XV47X156
XV49X107

Fig. 4

MODEL PIU5 VACUUM CLEANER


SCHEMATIC
ARM
FIELD
ON-OFF LINE SW
LINE
XV2X398
XV2X504
XV1X222
XV48X118
XV2X714
XV1X222
XV1X34
XV6X95
XV2X444
XV1X310
XV21X26
XV2X706
XV28X76 ASM. HH
XV27X119
DISPOSABLE BAG XV30X80
XV10X126 HH
XV2X542
XV1X233
XV1X234
XV48X119
XV2X902
XV2X427
XV1X234
XV1X564
XV1X555
XV36X104
XV1X256
XV1X290
XV1X289
XV36X68
XV31X132
XV2X798
XV6X94
XV23X150
XV1X554
XV2X703
XV14X60
XV2X687
XV2X100
XV23X139
XV3X10
XV31X102
XV27X137
XV2X701
XV2X702
XV31X136
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XV1X403
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XV23X151
XV23X131
XV2X444
XV2X487
XV1X403
XV1X294
XV1X398
XV14X79
XV1X567
XV5X45
XV1X409
XV1X412
XV2X916
XV14X69
XV2X939
XV30X121
XV35X115
XV1X412
XV2X916
XV1X241
XV2X690
XV1X390
XV15X78
XV3X143
XV1X522
XV1X391
XV2X592
XV1X386
XV1X393
XV60X44
XV1X387
XV2X693
XV2X692
XV2X695
XV1X103
XV30X20
XV19X119
XV1X477
XV33X88
XV10X176 H
XV31X156
XV2X917
XV14X98
XV1X294
XV1X198
XV4X14
XV1X553
XV1X288
XV36X75
XV3X10
XV2X734
XV37X83 ASM. H
XUY1X18
XV2X698
XV1X556
XV10X175 H
XV10X169
XV23X135
XV9X53
XV2X747

—NOT A SUPPLY PART
H,HH - INCLUDES ALL PARTS IN A COMPLETE ASM.

Fig. 5

76.02.02.02.

6. What part number below identifies the bearing housing as shown in Fig 4 (portable vacuum cleaner)?

   a. XV35X97
   b. XV36X90
   c. XV37X48
   d. XV23X146

7. The on/off is identified by what part number as shown on Fig 5 (upright) cleaner)?

   a. XV6X95
   b. XV31X156
   c. XV31X102
   d. XV6X94

8. What part number below identifies the vacuum cleaner bag clamp assembly as shown in Fig 5?

   a. XV2X706
   b. XV2X542
   c. XV10X126
   d. XV2X504

9. The motor bolt as shown in Fig 5 (upright cleaner) is identified by what number below?

   a. XV1X241
   b. XV5X45
   c. XV60X44
   d. XV1X290

10. What part number below identifies the suction plug as shown in Fig 5 (upright cleaner)?

    a. XV2X894
    b. XV31X132
    c. XV31X136
    d. XV23X150

76.02.02.03.

11. If a tank vacuum cleaner motor runs but there is little or no vacuum, check for:

    a. defective bearings.
    b. worn brushes.
    c. a loose fan on motor shaft.
    d. continuity of all leads and connections.

76.02.02.03. (continued)

12. A commutator needs cleaning if it appears:

    a. black.
    b. bright penny color.
    c. light chocolate color.
    d. rusty.

13. What condition on a vacuum cleaner prevents a satisfactory electrical contact between the brushes and the copper segments?

    a. low mica.
    b. high mica.
    c. shorts.
    d. open.

14. Faulty or grease-stained bearings on a vacuum cleaner can be detected by:

    a. running the motor very quickly on about 35 volts a.c.
    b. running the motor very slowly on about 35 volts a.c.
    c. running the motor at normal speed on about 35 volts a.c.
    d. running the motor very slowly on about 35 volts a.c.

15. If a vacuum cleaner is overheating, check:

    a. brush assembly.
    b. bearings on armature shaft.
    c. defective commutator.
    d. open field.

76.02.02.04.

16. Excessive grease on a vacuum cleaner motor can be removed with:

    a. soap and water solution.
    b. soft cloth soaked in carbon tetrachloride.
    c. soft cloth soaked in warm water.
    d. an open flame.

17. When the brushes are sticky in the vacuum cleaner brush gear:

    a. clean holder and brushes with a cloth dipped in alcohol.
    b. clean holder and brushes with a cloth dipped in carbon tetrachloride.
    c. clean holder and brushes with a cloth dipped in soap and water solution.
    d. clean holder and brushes with a cloth dipped in gasoline.

76.02.02.04. (continued)

18. Before placing the vacuum cleaner motor in operation:

    a. new brushes must be seated to the commutator curve.
    b. new brushes must be lubricated properly.
    c. new brushes must be cut to their proper size.
    d. new brushes must be soldered in place.

19. What is the suitable material for seating new brushes on a vacuum cleaner brush gear assembly?

    a. emery wheel brush.
    b. coarse sandpaper.
    c. hand file.
    d. very fine sandpaper.

20. If a vacuum cleaner is making too much noise:

    a. bad bearings; replace.
    b. damage or worn gears; replace.
    c. shorted switch; replace.
    d. brush worn out; replace.

76.02.02.05.

21. The brushes on a floor polisher rotate:

    a. about 16,500 rpm.
    b. about 500 rpm.
    c. similarly to the speed of a vacuum cleaner.
    d. above the speed of a vacuum cleaner.

22. Floor polisher motors are usually run on a voltage that is:

    a. 230 cycle.
    b. 50-cycle.
    c. 115 cycle.
    d. 60-cycle.

23. Floor polishers are usually what voltage?

    a. 12-volt D.C.
    b. 120-volt A.C.
    c. 220-volt A.C.
    d. 115-volt A.C.

76.02.02.05. (continued)

24. The base of the floor polisher is usually made of:

    a. die-cast aluminum.
    b. iron,
    c. tin.
    d. copper-plated iron.

25. The buffing wheels or brushes on a floor polisher are driven by the motor to go through what?

    a. spur gear train.
    b. slip-clutch.
    c. direct drive.
    d. transmission.

76.02.02.06.

26. Locate the toggle switch in the following illustration of a floor conditioner Fig. 6).

    a. 33
    b. 28
    c. 25
    d. 24

27. Locate the insulating sleeve in the following illustration of a floor conditioner (Fig. 6).

    a. 36
    b. 40
    c. 31
    d. 21

28. In the illustration of a floor conditioner (Fig 6) the number 17 indicates the location of what part?

    a. brush spring.
    b. brush holder.
    c. motor brush.
    d. clamp.

29. In the illustration of a floor conditioner (Fig 6) the number 3 indicates the location of what part?

    a. cover assembly.
    b. field assembly.
    c. field bracket.
    d. gear box.

PARTS DIAGRAM
Sunbeam Floor Conditioner

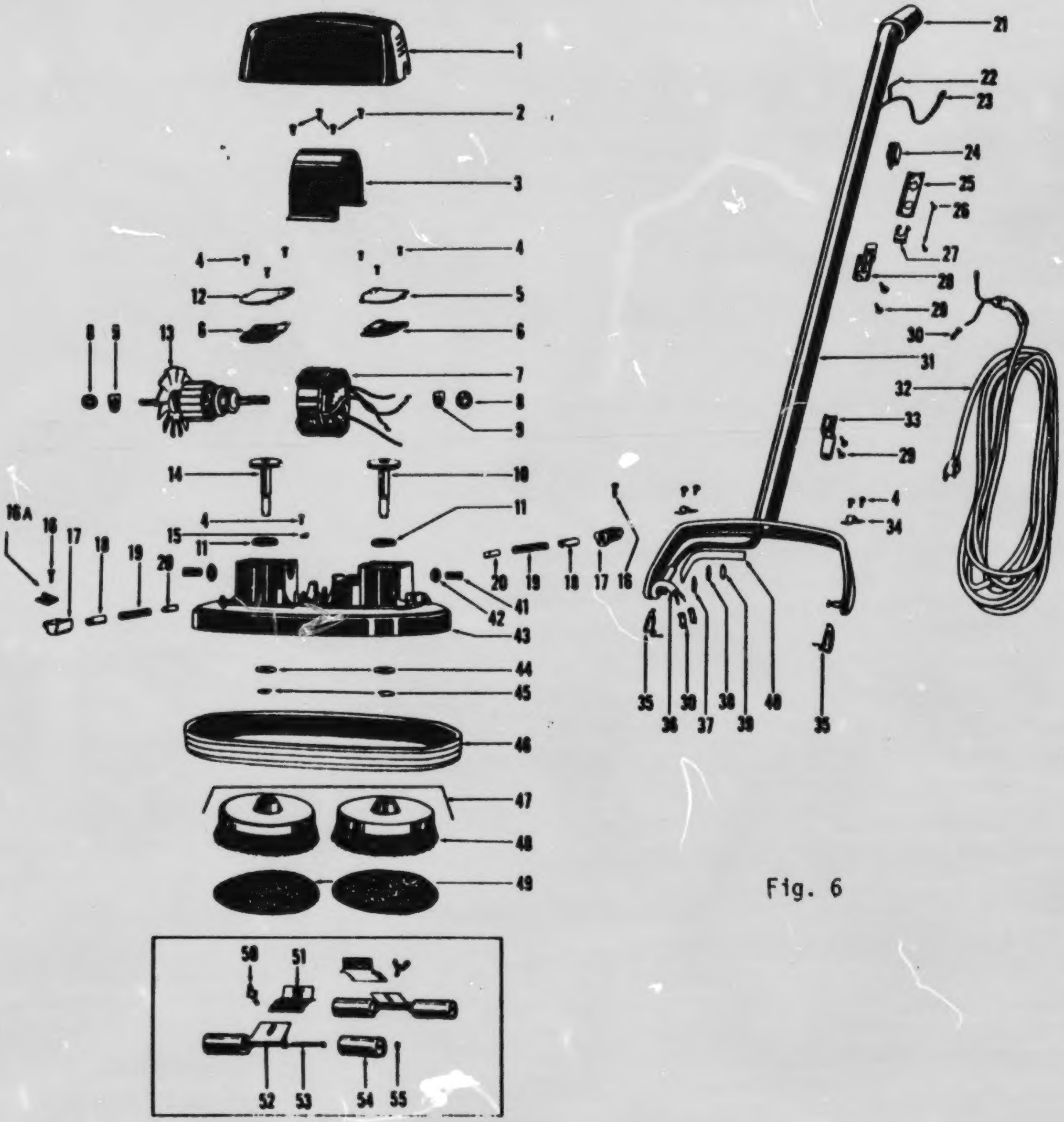
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Fig. 6

76.02.02.06. (continued)

30. Locate the grease retainer in the illustration of a floor conditioner (Fig. 6)

    a. 11
    b. 10
    c. 13
    d. 14

76.02.02.07.

31. If the floor polisher is too noisy or overheating, the trouble may be:

    a. brush worn out.
    b. open circuit.
    c. shorted switch.
    d. damaged or worn gears.

32. If the cord and switch of a floor polisher are all in good condition, check:

    a. the line cord for continuity.
    b. the motor for continuity.
    c. the power source for proper voltage.
    d. for a short circuit.

33. Lightly tapping the top or bottom of the spindle of a floor polisher may cause:

    a. a open circuit.
    b. a defect in spindle cage.
    c. a short in the motor.
    d. the spindles to run smoothly.

34. After the end play in the armature shaft is removed, why do you back off the screw approximately ¼ turn?

    a. to prevent binding.
    b. to tighten the bearings.
    c. to seat the bearing.
    d. to prevent an open circuit.

35. When the brush spindle fits loosely in the bearing of a floor polisher, it will cause:

    a. sparking.
    b. excessive noise.
    c. a short circuit.
    d. excessive speed.

76.02.02.08.

36. When the commutator in the motor of a floor polisher is dirty, but not pitted or rough, it can be cleaned with:

    a. 0-0 grade sandpaper.
    b. a soft cloth and vaseline.
    c. a soft cloth and gasoline.
    d. a soft cloth and carbon tetrachloride.

37. In the operation of the motor in a floor polisher once a high mica condition exists, the only cure is to:

    a. rewind the commutator.
    b. replace the commutator.
    c. turn down the commutator or on a lathe.
    d. insulate the commutator.

38. When the brushes of a floor polisher are sticky, it will be necessary to:

    a. clean both holder and brushes with a cloth dipped in gasoline.
    b. replace the brushes.
    c. clean only the brush with gasoline.
    d. replace the brush holder.

39. Excessive grease can be cleaned from the motor of a floor polisher by using:

    a. 0-0 grade sandpaper.
    b. a soft cloth and vaseline.
    c. a soft cloth and gasoline.
    d. a soft cloth soaked in carbon tetrachloride.

40. When should the commutator in the motor of a floor polisher be cleaned?

    a. if the commutator is a penny color.
    b. if the commutator is blue.
    c. if the commutator is chocolate color.
    d. if the commutator is black.

UNIT TEST ANSWER SHEET

PRETEST

Occupational Area: ____________
File Code: 76.02.02.00.A2-2
Name: ____________

ANSWERS

LAP 01	1.	D	LAP 05	21.	B	41.	
	2.	A		22.	D	42.	
	3.	C		23.	D	43.	
	4.	B		24.	A	44.	
	5.	A		25.	A	45.	
LAP 02	6.	B	LAP 06	26.	D	46.	
	7.	A		27.	A	47.	
	8.	A		28.	B	48.	
	9.	D		29.	C	49.	
	10.	C		30.	A	50.	
LAP 03	11.	C	LAP 07	31.	D	51.	
	12.	A		32.	B	52.	
	13.	B		33.	D	53.	
	14.	B		34.	A	54.	
	15.	B		35.	B	55.	
LAP 04	16.	B	LAP 08	36.	B	56.	
	17.	D		37.	C	57.	
	18.	A		38.	A	58.	
	19.	D		39.	D	59.	
	20.	A		40.	D	60.	

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Learning Activity Package

Student: ____________________

Date: ____________________

PERFORMANCE ACTIVITY: Operation of an Electric Vacuum Cleaner

OBJECTIVES:

Describe the operation of an electric vacuum cleaner.

Identify the operational characteristics of electric vacuum cleaners.

Draw a schematic diagram of the electrical circuit for a vacuum cleaner.

EVALUATION PROCEDURE:

Student is to write a description about the operation of a vacuum cleaner that is consistent with the attached Checklist.

Successfully complete at least 80% of the items on a multiple- choice test about this LAP.

RESOURCES:

Checklist: Operation of an Electric Vacuum Cleaner.
Vacuum Cleaner.
Home Appliance Servicing, Anderson.

PROCEDURE:

1. Read pages 322-337 in Home Appliance Servicing.
2. Follow the steps on the attached Checklist: Operation of an Electric Vacuum Cleaner.
3. Write a description of the operation of electric vacuum cleaners using simple schematic diagrams.
4. Complete the multiple-choice test items for this LAP.
5. Check your answers with the test key. If your answers are all correct, record your time for completing this LAP on your SPR. If you have missed any questions, try to find out why you missed the test items. If you have any further problems, check with your instructor. When you have correctly completed all the test items, you may record your time on your SPR.

Principal Author(s): T. Ziller

CHECKLIST: OPERATION OF AN ELECTRIC VACUUM CLEANER

____ 1. Check all air inlets and outlets for any foreign materials

____ 2. Connect hoses and filter bags.

____ 3. Plug vacuum cleaner into 115V 60HZ 15A fused outlet.

____ 4. Turn switch "on".

NOTE: One speed is sufficient on any vacuum cleaner; so there are no field taps on this universal type motor.

____ 5. Check hose inlets and outlets for proper air flow.

____ 6. Turn control switch "off" and disconnect from power source.

Student: ______________________ File Code: 76.02.02.01.A2-2

Date: ______________________ Date Published: 7/28/75

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LAP TEST: OPERATION OF AN ELECTRIC VACUUM CLEANER

1. The motor is connected in what relation to the suction-fan assembly on an upright vacuum cleaner?

   a. by slip clutch assembly.
   b. indirectly.
   c. by belt-and-pulley arrangement.
   d. directly.

2. The handle interlock switch on an upright vacuum cleaner is activated by:

   a. the handle release lever.
   b. separate cord.
   c. a toggle switch.
   d. the operator.

3. Air flow is created by what on a suction-type vacuum cleaner?

   a. by brush roller.
   b. by air from filter bag.
   c. by fans on the armature shaft.
   d. by a separate motor.

4. Most vacuum cleaners use the:

   a. repulsion motor.
   b. compound motor.
   c. universal motor.
   d. shaded-pole motor.

5. When power is applied to the vacuum cleaner:

   a. air is pulled through a hose or housing to create a suction.
   b. a 29" Hg. vacuum is created.
   c. the motor moves the vacuum cleaner.
   d. the pilot light comes on.

6. What allows the dust-free air to continue through the machine (motor and fan)?

   a. the attachments.
   b. exhaust.
   c. air flow.
   d. filter.

7. The vacuum cleaner armature assembly turns in a:

    a. **magnetic field.**
    b. **vacuum housing.**
    c. **electrical field.**
    d. **either direction.**

8. How is electricity passed into the windings on a vacuum cleaner?

    a. electrical connections.
    b. commutator segments connected to the armature coils.
    c. solid connection.
    d. by electrical field **created** in the motor.

9. Which of the following components is/are built into the fan assembly on a cannister type vacuum cleaner?

    a. armature only.
    b. field, armature, commutator and brush gear.
    c. commutator only.
    d. field only.

10. What prevents the armature shaft from overheating and wearing down?

    a. a bearing at each end of the shaft.
    b. fan on the vacuum cools the shaft.
    c. loosening the belt lessens the friction.
    d. fiber spacers between the armature and housing.

LAP TEST ANSWER KEY: OPERATION OF AN ELECTRIC VACUUM CLEANER

1. D
2. A
3. C
4. C
5. A
6. D
7. A
8. B
9. B
10. A

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Learning Activity Package

Student: ____________________

Date: ____________________

PERFORMANCE ACTIVITY: Disassembly of an Electric Vacuum Cleaner

OBJECTIVES:

Disassemble an electric vacuum cleaner.

Identify each component part of an electric vacuum cleaner.

EVALUATION PROCEDURE:

Instructor will examine the disassembled appliance for correct disassembly and parts identification in accordance with the attached checklist.

Successfully complete at least 80% of the items on a multiple-choice test about this LAP.

RESOURCES:

Checklist: Disassembly of an Electric Vacuum Cleaner.
Tools and electric vacuum cleaner.
Service Manuals for the appliance.

PROCEDURE:

1. Follow the steps on the attached Checklist: Disassembly of an Electric Vacuum Cleaner.
2. Complete the multiple-choice test items for this LAP.
3. Check your answers with the test key. If your answers are all correct, record your time for completing this LAP on your SPR. If you have missed any questions, try to find out why you missed the test items. If you have any further problems, check with your instructor. When you have correctly completed all the test items, you may record your time on your SPR.

Principal Author(s):

T. Ziller

CHECKLIST: DISASSEMBLY OF AN ELECTRIC VACUUM CLEANER

Upright

____ 1. Unclamp and remove bag.

____ 2. Disconnect and remove brush belt.

____ 3. Remove motor hood.

____ 4. Disconnect line cord at switch.

____ 5. Disconnect cord from switch to motor.

____ 6. Remove motor retention screws and remove motor.

____ 7. Loosen set screw and remove fan from motor.

____ 8. Disassemble motor.

____ 9. Identify and label each part.

____ 10. Have the instructor check your identifications.

Tank-Type

____ 1. Disconnect power cord at switch.

____ 2. If power cord is retractable, remove exhaust flange and cord retracting unit.

____ 3. Remove switch.

____ 4. Remove intake flange.

____ 5. Remove filter bag, revolving fan and hub.

____ 6. Remove screws and motor frame.

____ 7. Remove motor.

____ 8. Disassemble motor.

____ 9. Identify and label each part.

____ 10. Have the instructor check your identifications.

Student: ______________________ File Code: 76.02.02.02.A2-2

Date: ______________________ Date Published: 7/28/75

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LAP TEST: DISASSEMBLY OF AN ELECTRIC VACUUM CLEANER

1. What part number below identifies the blower assembly as shown in Fig. 4 (portable vacuum cleaner)?

   a. XV36X90
   b. XV23X147
   c. XV31X149
   d. XV1X310

2. What part number below identifies the carbon brush as shown in Fig. 4 (portable vacuum cleaner)?

   a. XV5X42
   b. XV2X895
   c. XV19X117
   d. XV2X427

3. What part number below identifies the bearing housing as shown in Fig. 4 (portable vacuum cleaner)?

   a. XV35X97
   b. XV36X90
   c. XV37X48
   d. XV23X146

4. The flat belt is identified by what part number as shown on Fig. 5 (upright cleaner)?

   a. XV4X14
   b. XV36X104
   c. XV10X123
   d. XV2X542

5. What part number below identifies the vacuum cleaner bag clamp assembly as shown in Fig. 5?

   a. XV2X706
   b. XV2X542
   c. XV10X126
   d. XV2X504

6. The fan spacer as shown in Fig. 5 (upright cleaner) is identified by what part number below?

   a. XV23X131
   b. XV2X734
   c. XV1X522
   d. XV23X139

7. What part number below identifies the motor baffle as shown in Fig. 5 (upright cleaner)?

   a. XV23X151
   b. XV23X131
   c. XV23X139
   d. XV36X68

8. The cam and trigger as shown in Fig. 5 (upright cleaner) is identified by what number below?

   a. XV30X20
   b. XV2X917
   c. XV2X918
   d. XV30X21

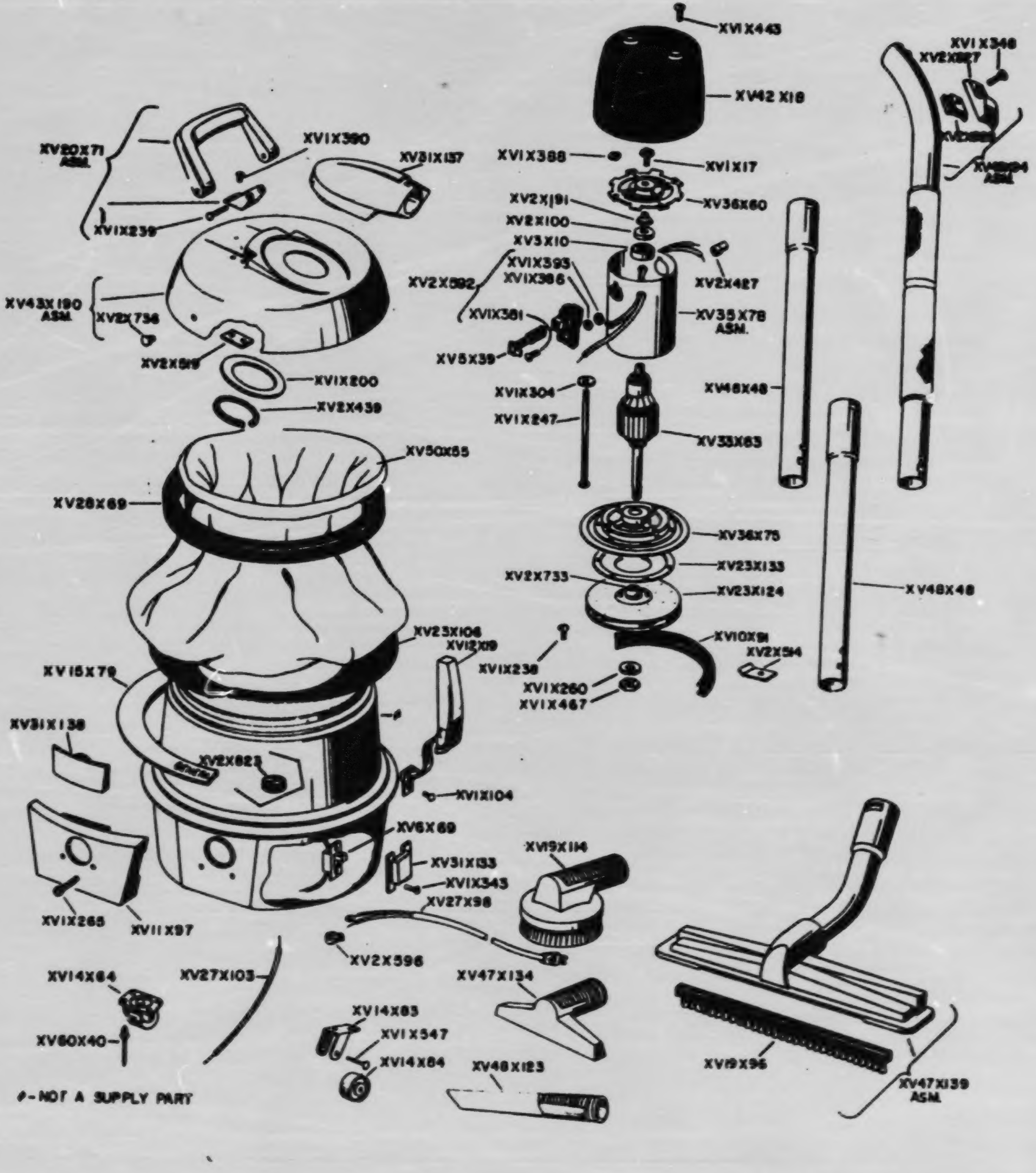
9. The blower plug as shown in Fig. 3 (canister cleaner) is identified by what number below?

   a. XV14X84
   b. XV27X198
   c. XV2X592
   d. XV31X138

10. What part number below identifies the suction plug as shown in Fig. 5 (upright cleaner)?

   a. XV2X894
   b. XV31X132
   c. XV31X136
   d. XV23X150

MODEL P2C14 CANISTER CLEANER


XVIX443
XVI X346
XV2X827
XV42 X18
XV20X71
ASM.
XVIX390
XV31X137
XVIX388
XVIX17
XV2X191
XV36X60
XV2X100
XVIX239
XV3X10
XVIX393
XVIX386
XV2X427
XV2X592
XV43X190
ASM.
XV2X736
XVIX381
XV35X78
ASM.
XV5X39
XV2X519
XVIX200
XVIX304
XV48X48
XV2X439
XVIX247
XV33X63
XV50X55
XV26X69
XV36X75
XV23X133
XV2X733
XV23X124
XV48X48
XV23X106
XV10X91
XVI2X19
XV2X514
XVIX238
XVI5X79
XVIX260
XVIX467
XV31X138
#
XV2X823
XVIX104
XV6X69
XVI9X114
XV31X133
XVIX343
XV27X98
XVIX265
XVIIX97
XV2X596
XVI4X64
XV27X103
XV47X134
XVI4X83
XVIX547
XV60X40
XVI4X84
XV48X123
XVI9X96
XV47X139
ASM.

#-NOT A SUPPLY PART

Fig. 3

MODEL P2MV2 PORTABLE VACUUM CLEANER

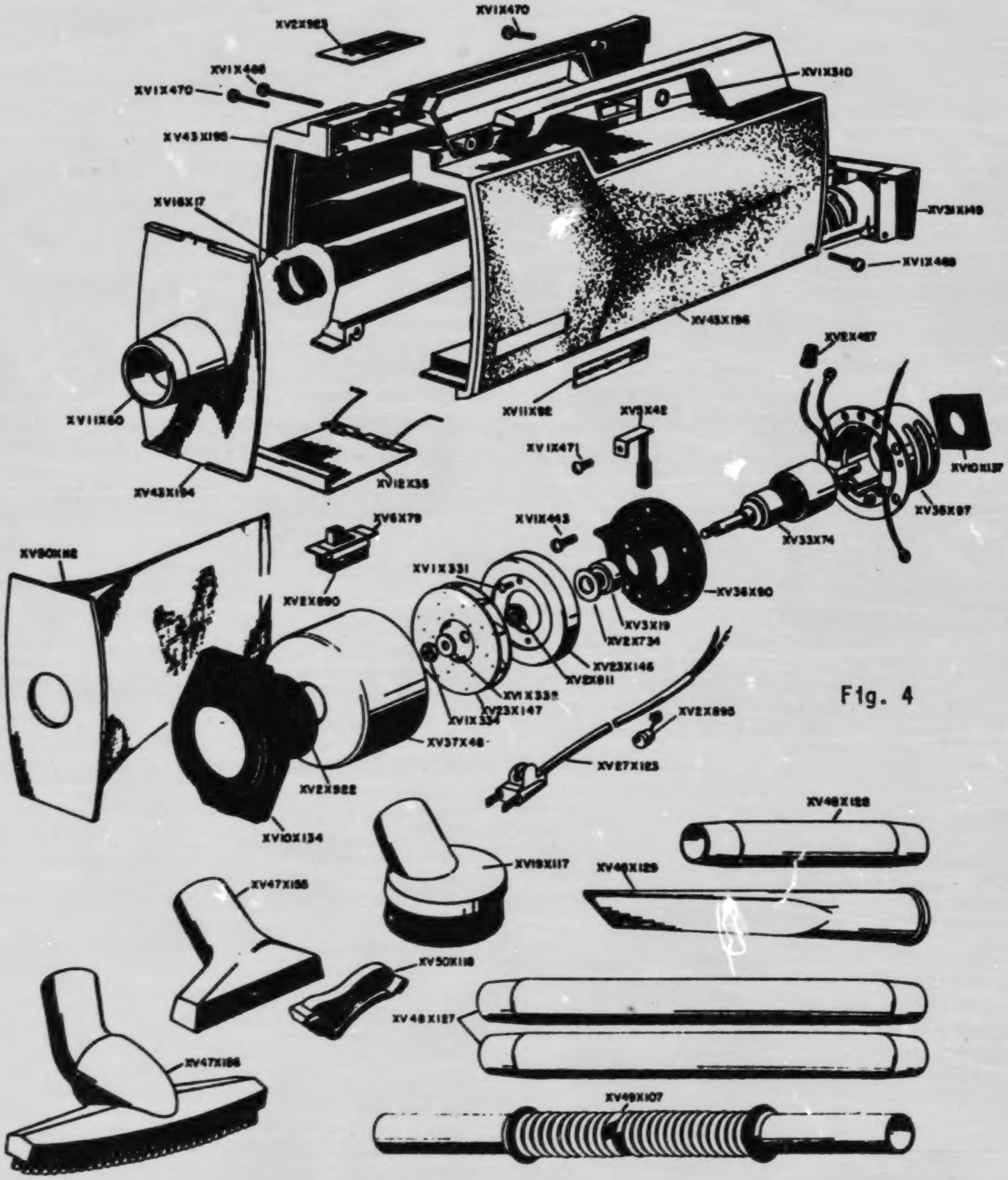
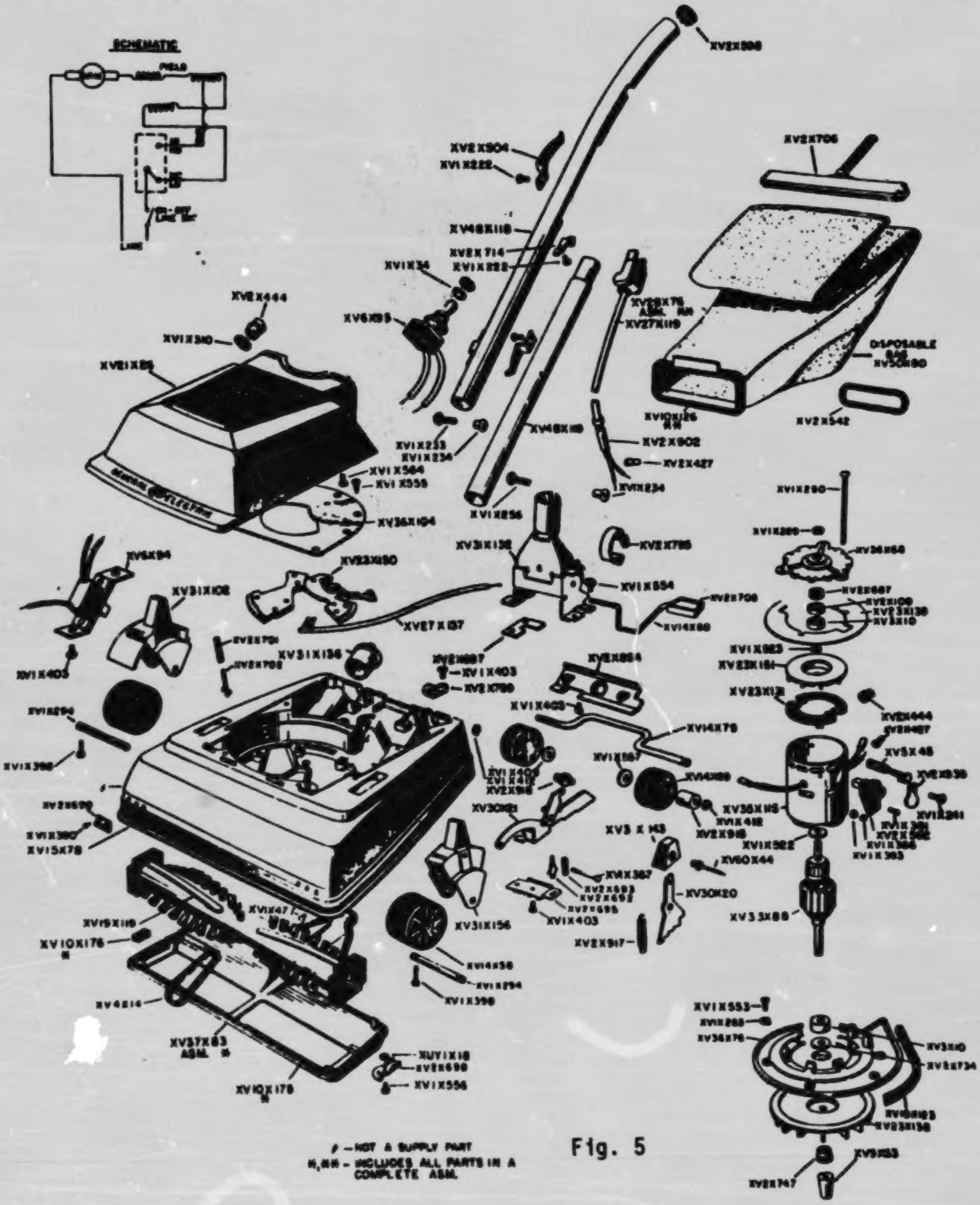

XV2X923
XV1X470
XV1X466
XV1X470
XV1X310
XV43X195
XV16X17
XV31X149
XV1X469
XV43X196
XV2X427
XV11X60
XV11X92
XV3X42
XV1X471
XV10X137
XV43X194
XV12X35
XV36X97
XV33X74
XV6X79
XV1X443
XV50X112
XV2X890
XV1X331
XV36X90
XV3X19
XV2X734
XV23X146
XV2X811
XV1X332
XV23X147
XV1X334
XV37X48
XV2X895
XV27X123
XV2X922
XV10X134
XV48X128
XV19X117
XV48X129
XV47X155
XV50X118
XV48X127
XV47X156
XV49X107

Fig. 4

MODEL PIU5 VACUUM CLEANER


SCHEMATIC
FIELD
LINE
XV2X898
XV2X904
XV1X222
XV46X118
XV2X714
XV1X222
XV1X34
XV6X95
XV2X444
XV1X310
XV21X25
XV1X233
XV1X234
XV1X564
XV1X555
XV1X256
XV36X104
XV2X706
XV28X75 ASM. HH
XV27X119
DISPOSABLE BAG XV30X80
XV10X126 HH
XV2X542
XV46X118
XV2X902
XV2X427
XV1X234
XV1X290
XV1X289
XV36X60
XV2X785
XV31X138
XV1X554
XV2X708
XV14X80
XV2X687
XV2X100
XV23X138
XV3X10
XV6X94
XV23X150
XV31X108
XV27X137
XV2X701
XV2X702
XV31X136
XV2X687
XV1X403
XV2X780
XV2X894
XV1X403
XV14X79
XV1X823
XV23X181
XV23X13
XV2X444
XV2X427
XV5X45
XV2X938
XV1X294
XV1X398
XV1X387
XV14X89
XV1X403
XV1X417
XV2X916
XV30X21
XV3X143
XV35X115
XV1X418
XV2X916
XV1X522
XV1X261
XV1X391
XV2X562
XV1X366
XV1X393
XV2X690
XV1X380
XV15X78
XV60X44
XV1X387
XV2X693
XV2X692
XV2X695
XV1X403
XV30X20
XV33X88
XV2X917
XV1X471
XV19X119
XV10X176 H
XV31X156
XV14X38
XV1X294
XV1X398
XV4X14
XV37X83 ASM. H
XUY1X18
XV2X690
XV1X556
XV10X170 H
XV1X553
XV1X288
XV34X76
XV3X10
XV2X734
XV10X103
XV23X136
XV9X53
XV2X747

— NOT A SUPPLY PART

H,HH - INCLUDES ALL PARTS IN A COMPLETE ASM.

Fig. 5

LAP TEST ANSWERKEY: DISASSEMBLY OF AN ELECTRIC VACUUM CLEANER

1. C
2. A
3. B
4. A
5. A
6. C
7. C
8. D
9. D
10. C

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Mountain-Plains Education &
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Glasgow AFB, Montana 59231

Learning Activity Package

Student:

Date:

PERFORMANCE ACTIVITY: Diagnosis of Malfunctions in an Electric Vacuum Cleaner

OBJECTIVE:

Diagnose malfunctions in an electric vacuum cleaner following the recommended procedures and using appropriate tools.

EVALUATION PROCEDURE:

Electrical values found during diagnosis are consistent with the specifications found on the manufacturer's name plate.

Score at least 80% on a written multiple-choice test.

RESOURCES:

Checklist: Diagnosis of Malfunctions - Electric Vacuum Cleaner.
Tools, test equipment, work order form and electric vacuum cleaner.
Service Manuals for the appliance.

PROCEDURE:

1. Follow the steps on the attached Checklist: Diagnosing Malfunctions - Electric Vacuum Cleaner.

2. Complete the multiple-choice test items for this LAP.

3. Check your answers with the test key. If your answers are all correct, record your time for completing this LAP on your SPR. If you have missed any questions, try to find out why you missed the test items. If you have any further problems, check with your instructor. When you have correctly completed all the test items, you may record your time on your SPR.

Principal Author(s): T. Ziller

CHECKLIST: DIAGNOSIS OF MALFUNCTIONS--ELECTRIC VACUUM CLEANER

_____ 1. Complete and attach work order form.

_____ 2. Make a thorough visual inspection.

_____ 3. Check line cords, pigtails etc. (Ohmmeter). Resistance: _____

_____ 4. Check power switches and electrical controls (Ohmmeter). Resistance: _____

_____ 5. Check interlocks, equipment fuses and breakers (Ohmmeter). Resistance: _____

_____ 6. Check motor (Growler and Ohmmeter). Resistance: _____ Current: _____

_____ 7. Check for defective motor brushes and bearings.

_____ 8. Check contacts.

_____ 9. Plug into 115V AC power source.

_____ 10. Take a voltage check (Voltmeter). Voltage: _____

_____ 11. Take a current check (Amprobe). Current: _____

_____ 12. Compute power dissipated by electric vacuum cleaner. Wattage: _____

_____ 13. Compare values with manufacturer's specifications or name plate.

NOTE: Refer to service manual for specific equipment data.

Student: ______________________ File Code: 76.02.02.03.A2-2

Date: ______________________ Date Published: 7/28/75

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LAP TEST: DIAGNOSIS OF MALFUNCTIONS IN AN ELECTRIC VACUUM CLEANER

1. Check for continuity of field coils and armature segments on a vacuum cleaner if:

   a. the cleaner does not pick up properly.
   b. it is a noisy vacuum.
   c. the motor will not run.
   d. there is little or no vacuum.

2. If vacuum cleaner brush will not rotate, check:

   a. for loose fan.
   b. continuity of field coils and armature segments.
   c. if broken belt or belt off.
   d. for broken or bent fan.

3. If vacuum cleaner is noisy during operation, check:

   a. for bag too full.
   b. for defective bearings.
   c. for broken belt.
   d. for worn brushes.

4. If vacuum cleaner motor will not run, check to see if:

   a. brushes are worn or brushes hung up.
   b. there is a broken belt.
   c. there are tight bearings.
   d. there is a broken fan.

5. A fair test of vacuum cleaner efficiency and speed is:

   a. wattage of the motor.
   b. circuit test.
   c. power source required.
   d. suction action.

6. If an upright vacuum cleaner only runs on high or low speeds, check:

   a. for broken belt.
   b. continuity of motor lead assembly.
   c. continuity of field coils.
   d. mechanical linkage from lever to switch.

7. To test a single-speed motor of 190 to 350 watts at reduced speed, what testing procedure should be followed?

   a. 50-watt lamp in series with one of the line leads.
   b. 200-watt lamp in series with one of the line leads.
   c. 100-watt lamp in series with one of the line leads.
   d. 350-watt lamp in series with one of the line leads.

8. What condition on a vacuum cleaner prevents a satisfactory electrical contact between the brushes and the copper segments?

   a. low mica.
   b. high mica.
   c. shorts.
   d. open.

9. Faulty or grease-stained bearings on a vacuum cleaner can be detected by:

   a. running the motor very quickly on about 35 volts A.C.
   b. running the motor very slowly on about 35 volts A.C.
   c. running the motor at normal on about 35 volts A.C.
   d. running the motor very slowly on about 35 volts D.C.

10. If a vacuum cleaner is overheating, check:

   a. brush assembly.
   b. bearings on armature shaft.
   c. defective commutator.
   d. open field.

LAP TEST ANSWER KEY: DIAGNOSIS OF MALFUNCTIONS IN AN ELECTRIC VACUUM CLEANER

1. C
2. C
3. B
4. A
5. A
6. D
7. C
8. B
9. B
10. B

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File Code: 76.02.02.04.A2-0

Date Published: 9/11/75

Learning Activity Package

Student: ____________

Date: ____________

PERFORMANCE ACTIVITY: Repair, Service and Reassembly of an Electric Vacuum Cleaner

OBJECTIVES:

Repair, service and reassemble an electric vacuum cleaner.

Order replacement parts for the electric vacuum cleaner.

EVALUATION PROCEDURE:

The appliance must operate properly.

Successfully complete at least 80% of the items on a multiple-choice test about this LAP.

RESOURCES:

Checklist: Repair, Service and Reassembly - Electric Vacuum Cleaner.
Test equipment, tools and requisition form.
Electric vacuum cleaner.
Service manuals for the appliance.

PROCEDURE:

1. Follow the steps on the attached Checklist: Repair, Service and Reassembly - Electric Vacuum Cleaner.

2. Complete the multiple-choice test items for this LAP.

3. Check your answers with the test key. If your answers are all correct, record your time for completing this LAP on your SPR. If you have missed any questions, try to find out why you missed the test items. If you have any further problems, check with your instructor. When you have correctly completed all the test items, you may record your time on your SPR.

Principal Author(s): T. Ziller

CHECKLIST: REPAIR, SERVICE AND REASSEMBLY--ELECTRIC VACUUM CLEANER

Repair & Service:

_____ 1. If the cordset is faulty, repair or replace.

_____ 2. If the controls are inoperative, replace with same type.

_____ 3. If the motor has an open, short or is grounded; repair or replace with proper motor size and type.

_____ 4. If any wire conductors are frayed, nicked or broken; replace with proper wire size and color code.

_____ 5. If suction fan blades are bent or damaged, replace.

_____ 6. If dust conainer is damaged, repair or replace.

_____ 7. If hoses are worn, replace.

_____ 8. Lubricate all bearings before reassembly.

Reassemble:

_____ 1. Replace motor armature into motor field housing.

_____ 2. Mount suction fan blades and housing to motor shaft.

_____ 3. Attach dust container with appropriate connectors.

_____ 4. Connect electrical wire to motor and its controls (use wire diagram).

_____ 5. Replace access cover.

Student: ______________________ **File Code:** 76.02.02.04.A2-2

Date: ______________________ **Date Published:** 7/28/75

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Glasgow AFB, Montana 59231

LAP TEST: REPAIR, SERVICE AND REASSEMBLY OF AN ELECTRIC VACUUM CLEANER

1. When a commutator on a vacuum cleaner is dirty, it can be cleaned with:

    a. a soft cloth and vaseline.
    b. a soap and water solution.
    c. a soft cloth and water.
    d. a soft cloth and carbon tetrachloride.

2. If the surface of the commutator on a vacuum cleaner is scratched or pitted, the commutator:

    a. must have the pits filled with copper oxide.
    b. must be replaced.
    c. must be turned down.
    d. must be smoothed with a very fine sandpaper of the 0-0 grade.

3. Dirt and dust can be removed from a motor on a vacuum cleaner by:

    a. cleaning solvent.
    b. suction pump.
    c. high pressure air.
    d. special brushes.

4. If the hacksaw blade vibrates when using the growler and hacksaw method to test the armature on a vacuum cleaner:

    a. the armature has a short.
    b. this is normal.
    c. the armature has an open coil.
    d. it does not mean anything, because sometimes this is normal and sometimes it is not.

5. Excessive grease on a vacuum cleaner motor can be removed with:

    a. soap and water solution.
    b. soft cloth soaked in carbon tetrachloride.
    c. soft cloth soaked in warm water.
    d. an open flame.

6. To prevent the bearings on a vacuum cleaner armature shaft from overheating:

    a. clean with carbon tetrachloride.
    b. replace bearings often.
    c. replace shaft only.
    d. lubricate.

7. When the brushes are sticky in the vacuum cleaner brush gear:

   a. clean holder and brushes with a cloth dipped in alcohol.
   b. clean holder and brushes with a cloth dipped in gasoline.
   c. clean holder and brushes with a cloth dipped in soap and water solution.
   d. clean holder and brushes with a cloth dipped in carbon tetrachloride.

8. Before placing the vacuum cleaner motor in operation:

   a. new brushes must be seated to the commutator curve.
   b. new brushes must be lubricated properly.
   c. new brushes must be cut to their proper size.
   d. new brushes must be soldered in place.

9. What is the suitable material for seating new brushes on a vacuum cleaner brush gear assembly?

   a. emery wheel brush.
   b. coarse sandpaper.
   c. hand file.
   d. very fine sandpaper.

10. If vacuum cleaner motor will not start but starts if rotor is turned a fraction of a revolution:

    a. open armature; replace.
    b. bad bearing; replace.
    c. open field; rewind field.
    d. short brushes; replace.

LAP TEST ANSWER KEY: **REPAIR, SERVICE AND REASSEMBLY OF AN ELECTRIC VACUUM CLEANER**

1. D
2. D
3. C
4. A
5. B
6. D
7. D
8. A
9. D
10. C

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File Code: 76.02.02.05.A2-0

Date Published: 9/11/75

Learning Activity Package

Student: ____________

Date: ____________

PERFORMANCE ACTIVITY: Operation of an Electric Floor Polisher

OBJECTIVES:

Describe the operation of a floor polisher.

Identify the operational characteristics of electric floor polishers.

Draw a schematic diagram of the electrical circuit for an electric floor polisher.

EVALUATION PROCEDURE:

Student is to write a description about the operation of a floor polisher that is consistent with the attached checklist.

Successfully complete at least 80% of the items on a multiple-choice test about this LAP.

RESOURCES:

Checklist: Operation of an Electric Floor Polisher.
Electric Floor Polisher.
Home Appliance Servicing, Anderson.

PROCEDURE:

1. Read pages 338-341 in Home Appliance Servicing.
2. Follow the steps on the attached Checklist: Operation of an Electric Floor Polisher.
3. Write a description of the operation of an electric floor polisher using simple schematics.
4. Complete the multiple-choice test items for this LAP.
5. Check your answers with the test key. If your answers are all correct, record your time for completing this LAP on your SPR. If you have missed any questions, try to find out why you missed the test items. If you have any further problems, check with your instructor. When you have correctly completed all the test items, you may record your time on your SPR.

Principal Author(s): T. Ziller

CHECKLIST: OPERATION OF AN ELECTRIC FLOOR POLISHER

____ 1. Check brushes for proper positioning on polisher.

____ 2. Turn control switch "off".

____ 3. Insert power plug into 115V 60HZ 15A fused outlet.

____ 4. Turn control switch "on".

NOTE: Not all floor polishers have the same motor type.

____ 5. Rotate control switch to all control positions.

NOTE: A tapped field in the motor causes the various motor speeds (brush speed 500 rpm).

____ 6. Turn switch "off".

____ 7. Unplug from power source.

Student: ____________________ File Code: 76.02.02.05.A2-2

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LAP TEST: OPERATION OF AN ELECTRIC FLOOR POLISHER

1. When energized, the floor polisher motor runs at what rate of speed?

   a. above the speed of a vacuum cleaner.
   b. about 500 RPM.
   c. similar to a vacuum cleaner.
   d. high, usually 16,500 RPM.

2. The floor polisher motor is directly coupled to reduction gears, allowing;

   a. a slip-clutch to bypass the gears.
   b. a transmission to function properly.
   c. a speed reduction of about 33 to 1.
   d. an automatic transmission drive.

3. The maintenance of modern floor polishers consists of:

   a. having a guarantee cover the unit.
   b. letting the wax protect the unit.
   c. a unit that protects it automatically.
   d. keeping the unit and its attachments clean at all times.

4. Floor polisher motors are usually run on a voltage that is:

   a. 230 cycle.
   b. 50-cycle.
   c. 115 cycle.
   d. 60-cycle.

5. Floor polishers are usually what voltage?

   a. 12 volt D.C.
   b. 120 volt A.C.
   c. 220 volt A.C.
   d. 115 volt A.C.

6. What type of current is required for operation of a floor polisher?

   a. A.C.
   b. A.C./D.C.
   c. pulsating D.C.
   d. D.C.

7. The hood on a floor polisher is usually made of:

   a. molded thermoplastic.
   b. aluminum.
   c. tin.
   d. glass.

8. What provides thorough floor scrubbing action with a floor polisher?

   a. air stream, water stream action.
   b. scrubbing, suction action.
   c. special combination of bristles.
   d. rotating steel wool.

9. The buffing wheels or brushes on a floor polisher are driven by the motor to go through what?

   a. spur gear train.
   b. slip-clutch.
   c. direct drive.
   d. transmission.

10. The base of the floor polisher is usually made of:

    a. die-cast aluminum.
    b. iron.
    c. tin.
    d. copper-plated iron.

LAP TEST ANSWER KEY: OPERATION OF AN ELECTRIC FLOOR POLISHER

1. D
2. C
3. D
4, D
5. D
6. A
7. A
8. C
9. A
10. A

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File Code: 76.02.02.06.A2-0

Date Published: 9/11/75

Learning Activity Package

Student: ______________________

Date: ______________________

PERFORMANCE ACTIVITY: Disassembly of an Electric Floor Polisher

OBJECTIVES:

Disassemble an electric floor polisher.

Identify component parts of an electric floor polisher.

EVALUATION PROCEDURE:

Instructor will examine the disassembled appliance for correct disassembly and parts identification in accordance with the attached checklist.

Successfully complete at least 80% of the items on a multiple-choice test about this LAP.

RESOURCES:

Checklist: Disassembly of an Electric Floor Polisher.
Tools and electric floor polisher.
Service Manuals for the appliance.

PROCEDURE:

1. Follow the steps on the attached Checklist: Disassembly of an Electric Floor Polisher.
2. Complete the multiple-choice test items for this LAP.
3. Check your answers with the test key. If your answers are all correct, record your time for completing this LAP on your SPR. If you have missed any questions, try to find out why you missed the test items. If you have any further problems, check with your instructor. When you have correctly completed all the test items, you may record your time on your SPR.

Principal Author(s):

T. Ziller

CHECKLIST: DISASSEMBLY OF AN ELECTRIC FLOOR POLISHER

_____ 1. Remove brushes.

_____ 2. Remove screws from motor housing and remove housing.

_____ 3. Disconnect electrical wires from motor.

_____ 4. Disconnect and remove switch assembly.

_____ 5. Disconnect line cord from switch.

_____ 6. Disconnect and remove tank.

_____ 7. Remove motor.

_____ 8. Identify parts by labeling.

_____ 9. Have the instructor check your identifications.

Student: ______________________ File Code: 76.02.02.06.A2-2

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EAP TEST: DISASSEMBLY OF AN ELECTRIC FLOOR POLISHER

1. In the illustration of a floor conditioner (Fig. 6) the number 13 indicates the location of what part?

   a. grease retainer.
   b. gear and shaft assembly.
   c. field assembly.
   d. fan and armature assembly.

2. In the illustration of a floor conditioner (Fig. 6) the number 9 indicates the location of what part?

   a. seal.
   b. screw.
   c. clamp.
   d. brush.

3. Locate the field assembly in the following illustration (Fig. 6) of a floor conditioner.

   a. 13
   b. 7
   c. 3
   d. 43

4. Locate the motor brush in the following illustration (Fig. 6) of a floor conditioner.

   a. 18
   b. 19
   c. 11
   d. 20

5. In the illustration of a floor conditioner (Fig. 6) the number 8 indicates the location of what part?

   a. clamp.
   b. brush.
   c. worn bearing.
   d. seal.

6. In the illustration of a floor conditioner (Fig. 6) the number 20 indicates the location of what part?

   a. switch lead.
   b. brush holder.
   c. brush spring.
   d. motor brush.

7. Locate the toggle switch in the following illustration of a floor conditioner (Fig. 6).

   a. 33
   b. 28
   c. 25
   d. 24

8. Locate the gear and shaft assembly in the following illustration of a floor conditioner (Fig. 6).

   a. 14
   b. 13
   c. 7
   d. 19

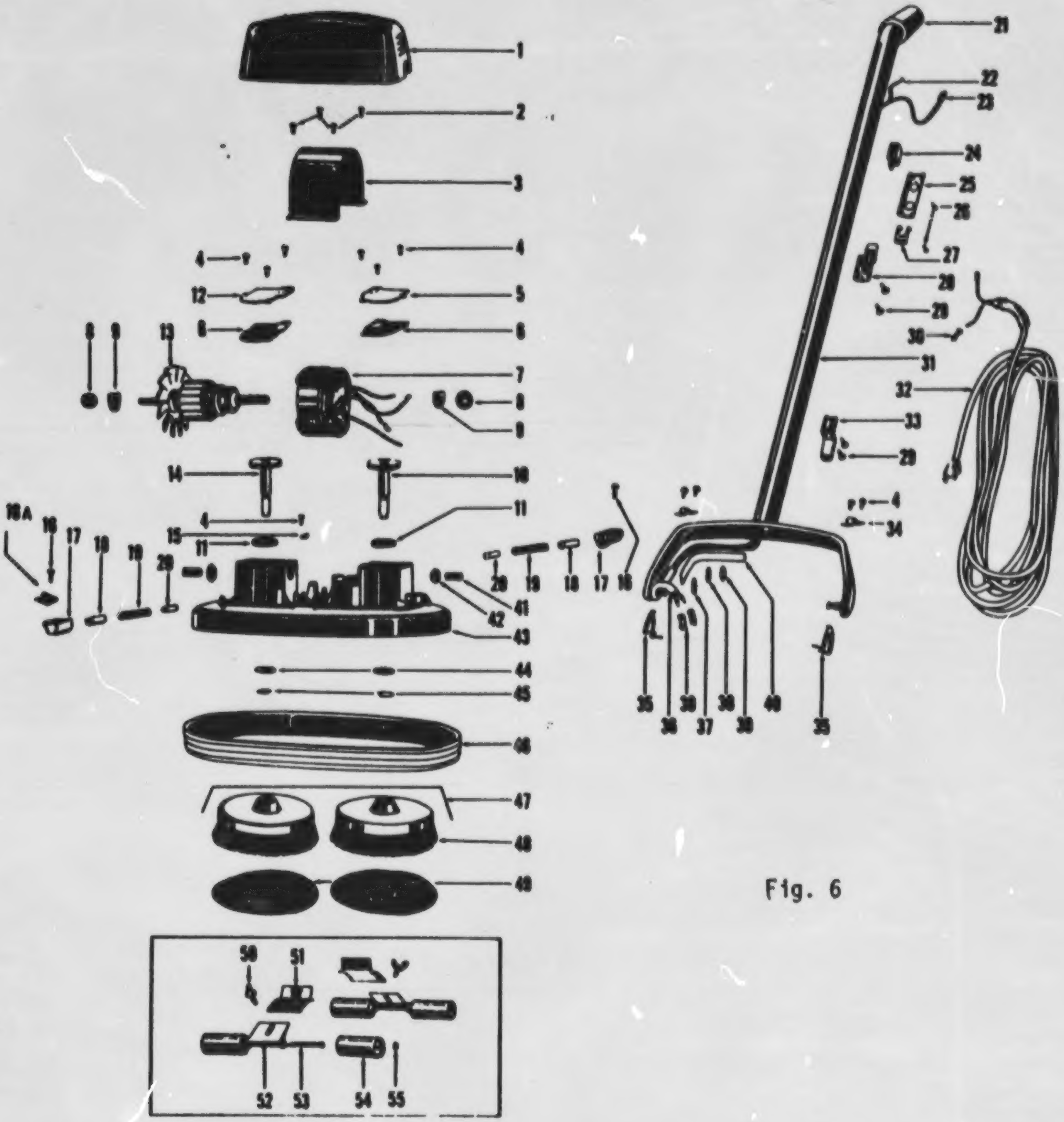
9. In the illustration of a floor conditioner (Fig. 6) the number 3 indicates the location of what part?

   a. cover assembly.
   b. field assembly.
   c. field bracket.
   d. gear box.

10. Locate the grease retainer in the following illustration of a floor conditioner (Fig. 6).

    a. 11
    b. 12
    c. 13
    d. 14

PARTS DIAGRAM
Sunbeam Floor Conditioner


1
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18A
16
17
18
19
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40
35

Fig. 6

LAP TEST ANSWER KEY: DISASSEMBLY OF AN ELECTRIC FLOOR POLISHER

1. D
2. A
3. B
4. D
5. C
6. D
7. D
8. A
9. C
10. A

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File Code: 76.02.02.07.A2-0

Date Published: 9/11/75

Learning Activity Package

Student: ____________________

Date: ____________________

PERFORMANCE ACTIVITY: Diagnosis of Malfunctions in an Electric Floor Polisher

OBJECTIVE:

Diagnose malfunctions in an electric floor polisher following the recommended procedures and using appropriate tools.

EVALUATION PROCEDURE:

Electrical values found during diagnosis are consistent with specifications found on the manufacturer's name plate.

Score at least 80% on a written multiple-choice test.

RESOURCES:

Checklist: Diagnosis of Malfunctions - Electric Floor Polisher.
Tools, test equipment, work order form and electric floor polisher.
Service Manuals for the appliance.

PROCEDURE:

1. Follow the steps on the attached Checklist: Diagnosing Malfunctions - Electric Floor Polisher.
2. Complete the multiple-choice test items for this LAP.
3. Check your answers with the test key. If your answers are all correct, record your time for completing this LAP on your SPR. If you have missed any questions, try to find out why you missed the test items. If you have any further problems, check with your instructor. When you have correctly completed all the test items, you may record your time on your SPR.

Principal Author(s): T. Ziller

CHECKLIST: DIAGNOSIS OF MALFUNCTIONS--ELECTRIC FLOOR POLISHER

_____ 1. Complete and attach the work order form.

_____ 2. Make a thorough visual inspection of the equipment.

_____ 3. Check line cords, pigtails, etc. (Ohmmeter). Resistance: _____

_____ 4. Check power switches and electrical controls (Ohmmeter). Resistance: _____

_____ 5. Check motor (Growler and Ohmmeter). Current: _____ Resistance: _____

_____ 6. Check for defective motor brushes and bearing.

_____ 7. Check contacts.

_____ 8. Check valves.

_____ 9. Check gear-boxes and gears.

NOTE: Refer to service manual for specific equipment data.

_____ 10. Plug appliance into 115V AC source.

_____ 11. Check voltage source (Voltmeter). Voltage: _____

_____ 12. Check current (Amprobe). Current: _____

_____ 13. Compute power dissipated by the appliance's motor. Wattage: _____

_____ 14. Compare your values with the manufacturer's specifications.

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LAP TEST: DIAGNOSIS OF MALFUNCTIONS IN AN ELECTRIC FLOOR POLISHER

1. If the floor polisher is too noisy or overheating, the trouble may be:

   a. brush worn out.
   b. open circuit.
   c. shorted switch.
   d. damaged or worn gears.

2. If the cord and plug checkout on the floor polisher but the motor still will not run, check:

   a. lubrication of bearings.
   b. power switches.
   c. motor armature.
   d. commutator mica.

3. If the cord and switch of a floor polisher are all in good condition, check:

   a. the line cord for continuity.
   b. the motor for continuity.
   c. the power source for proper voltage.
   d. for a short circuit.

4. The most common cause of trouble in the motor of a floor polisher is/are:

   a. a broken control switch.
   b. shorts in the motor.
   c. rusty bearings.
   d. worn-out brushes.

5. If the new spindle on a floor polisher is loose it is probably caused by:

   a. a faulty spindle.
   b. a short in the armature.
   c. a cog broken in the gear box.
   d. a worn spindle bearing.

6. If there is excessive play between the armature shaft and the bronze bearing, it will be necessary to:

   a. turn down the shaft.
   b. replace the armature sleeve bearing.
   c. build up the shaft.
   d. replace shaft.

7. If new gears have been installed in a floor polisher and it runs with excess noise, check:

   a. brushes for wear.
   b. new gears for a chip in cogs.
   c. lubrication of gears.
   d. nut on spindle and tighten.

8. Lightly tapping the top or bottom of the spindle of a floor polisher may cause:

   a. an open circuit.
   b. a defect in spindle cage.
   c. a short in the motor.
   d. the spindles to run smoothly.

9. After the end play in the armature shaft is removed, why do you back off the screw approximately ¼ turn?

   a. to prevent binding.
   b. to tighten the bearings.
   c. to seat the bearing.
   d. to prevent an open circuit.

10. When the brush spindle fits loosely in the bearing of a floor polisher, it will cause:

   a. sparking.
   b. excessive noise.
   c. a short circuit.
   d. excessive speed.

LAP TEST ANSWER KEY: DIAGNOSIS OF MALFUNCTIONS IN AN ELECTRIC FLOOR POLISHER

1. D
2. B
3. B
4. D
5. D
6. B
7. D
8. D
9. A
10. B

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Learning Activity Package

Student: ____________________

Date: ____________________

PERFORMANCE ACTIVITY: Repair, Service and Reassembly of an Electric Floor Polisher

OBJECTIVES:

Repair, service and reassemble an electric floor polisher.

Order replacement parts for the electric floor polisher.

EVALUATION PROCEDURE:

The appliance must operate properly.

Successfully complete at least 80% of the items on a multiple-choice test about this LAP.

RESOURCES:

Checklist: Repair, Service and Reassembly - Electric Floor Polisher.
Test equipment, tools and requisition form.
Electric floor polisher.
Service manuals for the appliance.

PROCEDURE:

1. Follow the steps on the attached Checklist: Repair, Service and Reassembly - Electric Floor Polisher.

2. Complete the multiple-choice test items for this LAP.

3. Check your answers with the test key. If your answers are all correct, record your time for completing this LAP on your SPR. If you have missed any questions, try to find out why you missed the test items. If you have any further problems, check with your instructor. When you have correctly completed all the test items, you may record your time on your SPR.

Principal Author(s): T. Ziller

CHECKLIST: REPAIR, SERVICE AND REASSEMBLY--ELECTRIC FLOOR POLISHER

Repair & Service:

_____ 1. If the power cord is frayed, worn or electrically open or shorted; replace with new cord.

_____ 2. If power switch or manual controls are inoperative, replace or repair.

_____ 3. If any connectors, wires or terminals are damaged, replace with same size, type and/or color code.

_____ 4. If the motor has any shorts, opens or grounds; repair or replace with same type and size.

_____ 5. If the spindles are damaged or worn, replace (left or right spindle).

_____ 6. If worm gears are damaged, replace complete armature shaft.

_____ 7. If motor gears or bearings are dry, lubricate with high grade grease.

_____ 8. If the motor or spindle bearings are damaged, replace.

Reassemble:

_____ 1. Replace spindle bearings and bushings.

_____ 2. Insert motor armature into field housing.

_____ 3. Poisition spindles and worm gears to mesh with each other.

_____ 4. Pack spindle housing and worm gears with high quality lubricant.

_____ 5. Replace access motor panels.

_____ 6. Connect electrical wires (use wire diagram).

_____ 7. Attach both manual and electrical controls.

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LAP TEST: REPAIR, SERVICE AND REASSEMBLY OF AN ELECTRIC FLOOR POLISHER

1. Whenever the brushes of a polisher are replaced, the motor should be run in for:

   a. 2 hours at half the rated voltage.
   b. 1 hour at the fuel rated voltage.
   c. 1 hour at half the rated voltage.
   d. 2 hours at half the rated voltage, and 1 hour at the full rated voltage.

2. What type of grease do you use to grease the gear housing of a floor polisher?

   a. transmission grease.
   b. axle grease.
   c. high grade ball bearing grease.
   d. transmission fluid.

3. If a new spindle fits too loosely in the motor of a floor polisher, it will be necessary to:

   a. clean the spindle bearing.
   b. the new spindle is the wrong size.
   c. replace the spindle bearing.
   d. grease the spindle.

4. If there is excessive play between the armature shaft and the bronze bearings of the floor polisher, it will be necessary to:

   a. replace the armature shaft.
   b. replace the armature sleeve.
   c. replace the bronze bearing.
   d. replace both armature shaft and bearings.

5. When the commutator in the motor of a floor polisher is dirty, but not pitted or rough, it can be cleaned with:

   a. o-o grade sandpaper.
   b. a soft cloth and vaseline.
   c. a soft cloth and gasoline.
   d. a soft cloth and carbon tetrachloride.

6. Most of the dirt in the motor of a floor polisher can be removed by:

   a. using water only.
   b. using soap and water.
   c. using a vacuum cleaner in the blow position.
   d. using wax remover.

7. In the operation of the motor in a floor polisher once a high mica condition exists, the only cure is to:

   a. rewind the commutator.
   b. replace the commutator.
   c. turn down the commutator on a lathe.
   d. insulate the commutator.

8. When the brushes of a floor polisher are sticky, it will be necessary to:

   a. clean both holder and brushes with a cloth dipped in gasoline.
   b. replace the brushes.
   c. clean only the brush with gasoline.
   d. replace the brush holder.

9. What color should a good commutator in the motor of a floor polisher have?

   a. black.
   b. bright penny color.
   c. light chocolate.
   d. navy blue.

10. When should the commutator in the motor of a floor polisher be cleaned?

   a. if the commutator is penny color.
   b. if the commutator is blue.
   c. if the commutator is chocolate colored.
   d. if the commutator is black.

LAP TEST ANSWER KEY: REPAIR, SERVICE AND REASSEMBLY OF AN ELECTRIC FLOOR POLISHER

1. D
2. C
3. C
4. B
5. B
6. C
7. C
8. A
9. C
10. D

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Date: ______________________ Date Published: 7/29/75

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UNIT POST TEST: VACUUM CLEANERS AND FLOOR POLISHERS

76.02.02.01.

1. Which vacuum cleaner depends for its cleaning action on air suction and revolving brush action?

   a. cylinder.
   b. upright.
   c. tank.
   d. upright and cylinder.

2. A straight suction type vacuum cleaner depends for it's operation:

   a. upon the high velocity of air at its nozzle.
   b. its compact size.
   c. use of small nozzles.
   d. use of special attachments.

3. When a suction action is acquired on a vacuum cleaner:

   a. dirt is pulled in with the air and is deposited in a bag or collector tank.
   b. dirt flows out through a special exhaust.
   c. dust and air build up a pressure.
   d. dirt and air flow out the exhaust.

4. The vacuum cleaner bag or collector tank acts as a:

   a. filter.
   b. air circulator.
   c. exhaust.
   d. damper.

5. The vacuum cleaner armature assembly turns in a:

   a. vacuum housing.
   b. magnetic field.
   c. electrical field.
   d. either direction.

76.02.02.02.

6. What part number below identifies the armature as shown in Fig. 3 of a canister vacuum cleaner?

   a. XV2X733
   b. XV35X78
   c. XV33X63
   d. XV2X592

7. What part number below identifies the fan as shown in Fig. 3 (canister cleaner)?

   a. XV36X75
   b. XV23X124
   c. XV23X133
   d. XV36X60

8. The On/Off switch is identified by what part number as shown on Fig. 5 (upright cleaner)?

   a. XV6X95
   b. XV31X156
   c. XV31X102
   d. XV6X94

9. What part number below identifies the suction control spring as shown on Fig. 5 (upright cleaner)?

   a. XV2X701
   b. XV2X687
   c. XV2X693
   d. XV2X917

10. The motor bolt as shown in Fig. 5 (upright cleaner) is identified by what number below?

   a. XV1X241
   b. XV5X45
   c. XV60X44
   d. XV1X290

76.02.02.03.

11. To test for grounded parts on the vacuum cleaner, check the hand assembly and motor unit separately by means of a:

   a. voltmeter.
   b. low-voltage transformer.
   c. high-voltage transformer.
   d. ohmmeter.

MODEL P2C14 CANISTER CLEANER

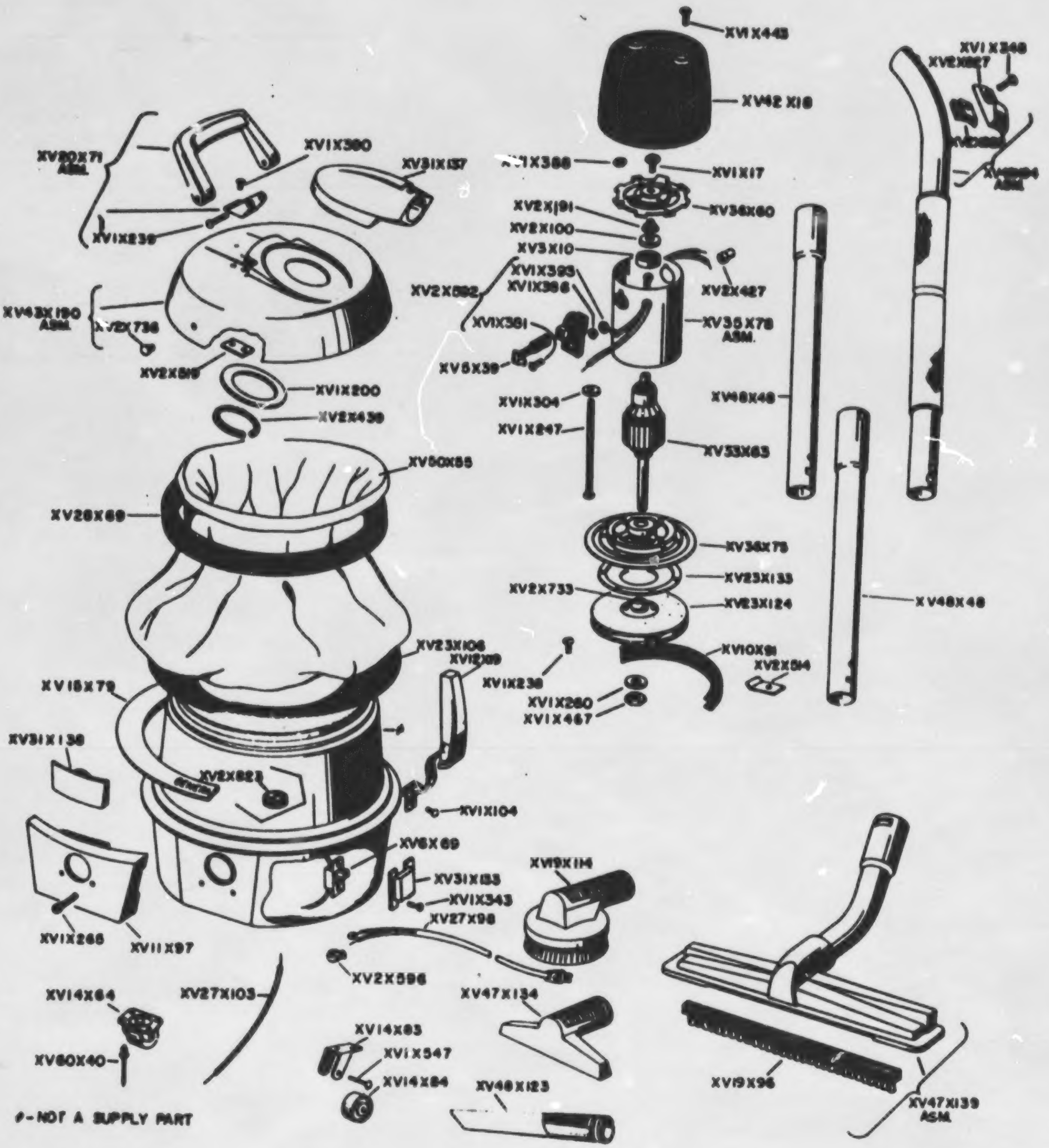
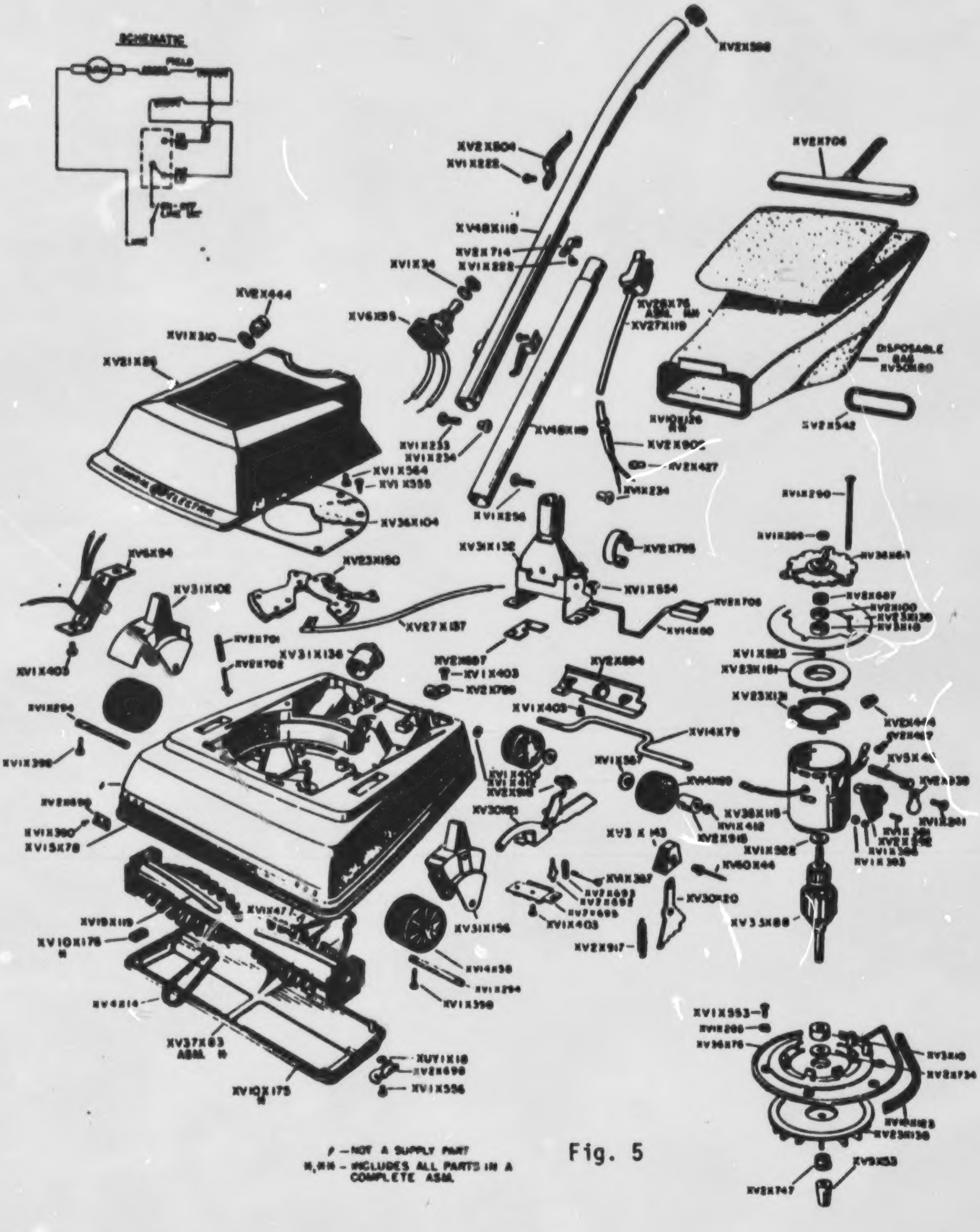

XV1X443
XV42X18
XV1X348
XV2X827
XV20X71 ASM.
XV1X380
XV31X137
XV1X388
XV1X17
XV36X60
XV1X239
XV2X191
XV2X100
XV3X10
XV1X393
XV1X386
XV2X592
XV2X427
XV43X190 ASM.
XV2X736
XV1X381
XV35X78 ASM.
XV5X39
XV2X519
XV1X200
XV2X439
XV1X304
XV1X247
XV46X46
XV53X63
XV50X55
XV28X69
XV36X75
XV23X133
XV2X733
XV23X124
XV46X46
XV23X106
XV12X19
XV10X91
XV2X514
XV1X238
XV15X79
XV1X280
XV1X467
XV31X136
XV2X823
XV1X104
XV6X69
XV19X114
XV31X133
XV1X343
XV27X98
XV1X266
XV11X97
XV2X596
XV14X64
XV27X103
XV47X134
XV14X83
XV1X547
XV60X40
XV14X84
XV19X96
XV46X123
XV47X139 ASM.
#-NOT A SUPPLY PART

Fig. 3

MODEL PIU5 VACUUM CLEANER


SCHEMATIC
FIELD
LINE
XV2X588
XV2X804
XV1X222
XV48X118
XV2X714
XV1X222
XV1X26
XV2X444
XV1X310
XV6X95
XV21X89
XV2X706
XV27X75 ASM. HH
XV27X119
DISPOSABLE BAG XV30X60
XV10X126 HH
XV2X542
XV1X233
XV1X234
XV48X118
XV2X902
XV2X427
XV1X234
XV1X564
XV1X355
XV36X104
XV1X236
XV1X290
XV1X209
XV36X61
XV6X94
XV23X150
XV31X132
XV2X795
XV1X554
XV31X102
XV27X137
XV2X706
XV14X60
XV2X687
XV2X100
XV23X130
XV3X10
XV2X701
XV2X702
XV31X136
XV2X687
XV1X403
XV2X799
XV2X604
XV1X823
XV23X151
XV1X403
XV23X12
XV1X403
XV1X294
XV2X444
XV2X427
XV1X398
XV14X79
XV5X41
XV1X567
XV1X409
XV1X412
XV2X916
XV14X80
XV2X838
XV2X690
XV1X390
XV15X78
XV30X21
XV36X115
XV1X412
XV2X916
XV1X261
XV3X143
XV1X328
XV1X393
XV60X44
XV1X387
XV7X693
XV7X692
XV7X695
XV30X20
XV1X403
XV35X88
XV1X471
XV19X119
XV10X176 H
XV31X156
XV2X917
XV14X38
XV1X294
XV1X398
XV4X14
XV37X83 ASM. H
XV1X553
XV1X288
XV36X76
XV3X10
XV2X734
XUTIX18
XV2X698
XV1X556
XV10X175 H
XV10X123
XV23X136
XV3X53
XV2X747

—NOT A SUPPLY PART

H,HH - INCLUDES ALL PARTS IN A COMPLETE ASM.

Fig. 5

76.02.02.03. (continued)

12. If a tank vacuum cleaner motor runs but there is little or no vacuum, check for:

    a. defective bearings.
    b. worn brushes.
    c. a loose fan on motor shaft.
    d. continuity of all leads and connections.

13. If the vacuum cleaner motor stops, the probable cause is:

    a. an open field.
    b. brushes and commutator are in contact with each other.
    c. brushes and commutator are not in contact with each other.
    d. armature windings too tight.

14. A commutator needs cleaning if it appears:

    a. black.
    b. bright penny color.
    c. light chocolate color.
    d. rusty.

15. Scratches on the copper segments of a commutator on a vacuum cleaner cause what to occur?

    a. it will ruin the commutator.
    b. it will chew the carbon brushes to pieces.
    c. it will cause a short.
    d. it will stop the armature.

76.02.02.04.

16. If high mica exists on a vacuum cleaner:

    a. check mica for proper size.
    b. replace the commutator with a new one.
    c. replace with low mica.
    d. turn down the commutator in a lathe.

17. High mica on a vacuum cleaner can be prevented by:

    a. undercutting the mica as soon as the copper segments reach the level of the mica.
    b. undercutting the mica as soon as the copper segments are below the level of the mica.
    c. undercutting the mica as soon as the copper segments are above the level of the mica.
    d. using proper size mica when rewinding the armature.

76.02.02.04. (continued)

18. When brushes in the vacuum cleaner are worn:

    a. replace brush gear assembly.
    b. replace brush holder.
    c. replace brushes.
    d. replace armature.

19. If there is sparking at the brushes of a vacuum cleaner motor:

    a. brushes need replacing.
    b. commutator needs to have mica undercut.
    c. open in field winding.
    d. open in armature.

20. If a vacuum cleaner is making too much noise:

    a. bad bearings; replace.
    b. damage or worn gears; replace.
    c. shorted switch; replace.
    d. brush worn out; replace.

76.02.02.05.

21. The brushes on a floor polisher rotate:

    a. about 16,500 RPM.
    b. about 500 RPM.
    c. similarly to the speed of a vacuum cleaner.
    d. above the speed of a vacuum cleaner.

22. In most cases the liquid in the dispensing tank on a floor polisher is controlled by:

    a. a solenoid relay.
    b. an automatic valve.
    c. a manually-operated valve.
    d. a switching device.

23. The maintenance of modern floor polishers consists of:

    a. having a guarantee cover the unit.
    b. letting the wax protect the unit.
    c. a unit that protects it automatically.
    d. keeping the unit and its attachments clean at all times.

76.02.02.05. (continued)

24. Floor polisher motors are usually run on a voltage that is:

    a. 230 cycle.
    b. 50-cycle.
    c. 115 cycle.
    d. 60-cycle.

25. The hood on a floor polisher is usually made of:

    a. tin.
    b. aluminum.
    c. molded thermoplastic.
    d. glass.

76.02.02.06.

26. Locate the insulating sleeve in the following illustration of a floor conditioner (Fig. 6).

    a. 36
    b. 40
    c. 31
    d. 21

27. In the illustration of a floor conditioner (Fig. 6) the number 17 indicates the location of what part?

    a. brush spring.
    b. brush holder.
    c. motor brush.
    d. clamp.

28. Locate the bearing and base assembly in the following illustration of a floor conditioner (Fig.6).

    a. 46
    b. 43
    c. 13
    d. 7

29. In the illustration of a floor conditioner (Fig. 6) the number 22 indicates the location of what part?

    a. clamp.
    b. toggle switch.
    c. switch lead.
    d. upper cord hook.

PARTS DIAGRAM
Sunbeam Floor Conditioner

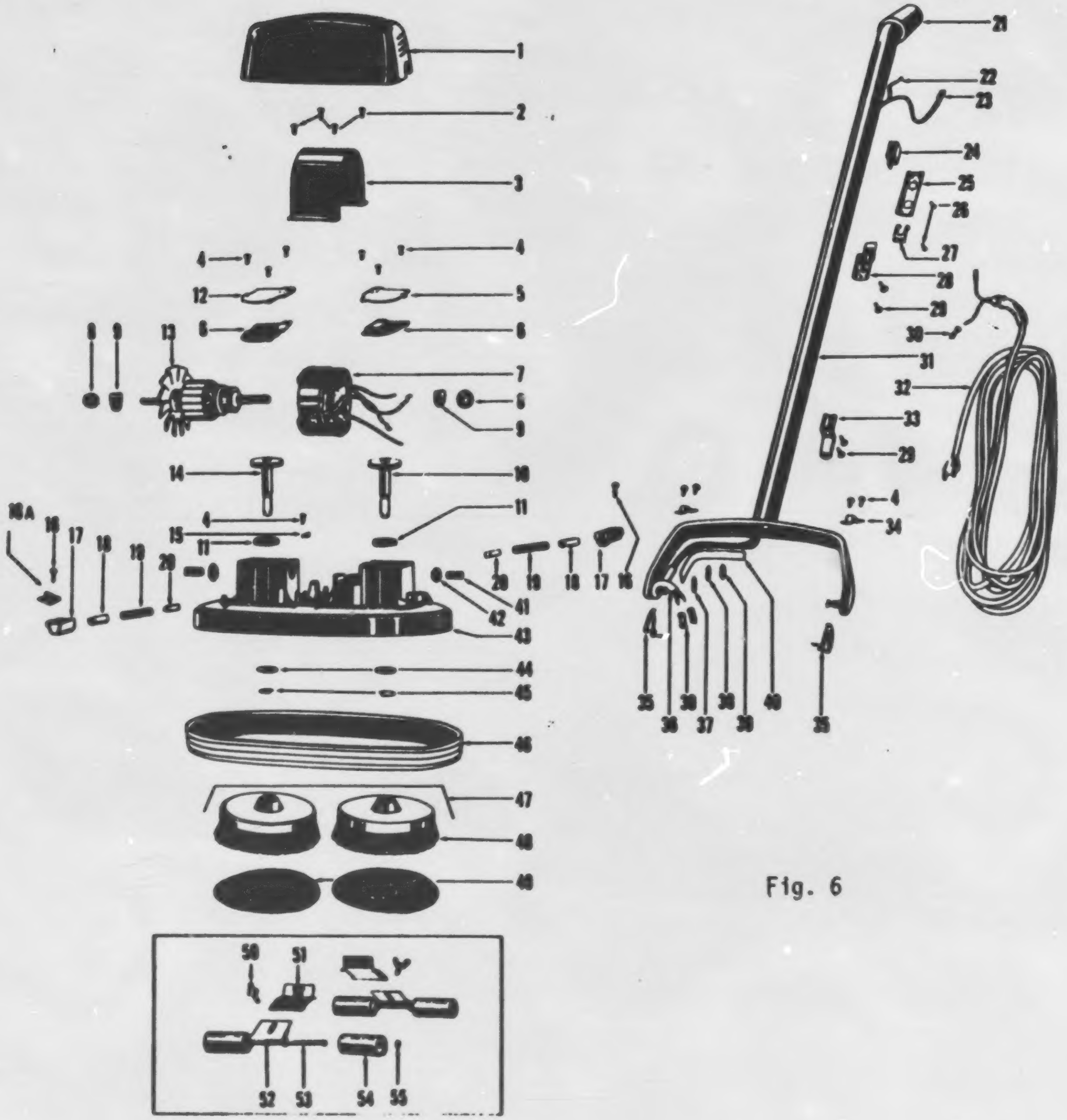

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Fig. 6

76.02.02.06. (continued)

30. In the illustration of a floor conditioner (Fig. 6) the number 23 indicates the location of what part?

    a. toggle switch.
    b. cord set
    c. lead guard.
    d. terminal and lead assembly.

76.02.02.07.

31. The power switches and electrical control of a floor polisher can be checked by:

    a. growler.
    b. millimeter.
    c. voltmeter.
    d. odometer.

32. The regular maintenance check for a floor polisher consists of checking:

    a. bristle pad length.
    b. power switches.
    c. shaft-bearing lubrication.
    d. speed of motor.

33. If the motor of the floor polisher refuses to run, first check:

    a. motor.
    b. line cord and plug.
    c. motor brushes and bearing.
    d. damaged or worn gears.

34. When checking the carbon brushes of a floor polisher, they should measure at least:

    a. 1/4 inch.
    b. 1/2 inch.
    c. 1 inch.
    d. 3/4 inch.

35. The equipment fuses and breakers of a floor polisher circuit are checked by:

    a. a pilot light.
    b. a voltmeter.
    c. a test light.
    d. an ohmmeter.

76.02.02.08.

36. When checking the line cord and plug of a floor polisher you find wires broken inside the insulation, it will be necessary to:

    a. replace the insulation.
    b. reconnect the broken wires.
    c. replace the broken wires.
    d. install new line plug.

37. After replacing the gears in the motor of a floor polisher, you should:

    a. oil gear.
    b. reassembly gear housing.
    c. operate motor to see if gears fit.
    d. repack gear housing with grease.

38. If in the motor of the floor polisher the surface of the commutator is scratched or pitted, it must be:

    a. smoothed with 0-0 grade sandpaper.
    b. replace the commutator.
    c. clean the commutator.
    d. fill the pits.

39. Name the only suitable material used for seating new brushes in a floor polisher.

    a. emery brush.
    b. hand file.
    c. grind stone.
    d. 0-0 grade sandpaper.

40. When checking the switch of a floor polisher you find the toggle handle is very loose, it will be necessary to:

    a. repair the broken part.
    b. clean the switch.
    c. tighten the wire connecting the switch.
    d. replace the switch.

UNIT TEST ANSWER SHEET

POST TEST

Occupational Area: ____________________

File Code: 76.02.02.00.B2-2

Name: ____________________

ANSWERS

LAP 01	1.	B	LAP 05	21.	B	41.	
	2.	A		22.	C	42.	
	3.	A		23.	D	43.	
	4.	A		24.	D	44.	
	5.	B		25.	C	45.	
LAP 02	6.	C	LAP 06	26.	A	46.	
	7.	B		27.	B	47.	
	8.	A		28.	B	48.	
	9.	A		29.	C	49.	
	10.	D		30.	D	50.	
LAP 03	11.	C	LAP 07	31.	C	51.	
	12.	C		32.	C	52.	
	13.	C		33.	B	53.	
	14.	A		34.	B	54.	
	15.	B		35.	D	55.	
LAP 04	16.	D	LAP 08	36.	D	56.	
	17.	A		37.	D	57.	
	18.	C		38.	A	58.	
	19.	B		39.	D	59.	
	20.	A		40.	D	60.	

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Student: ____________________ File Code: 76.02.02.00.A1-5

Date: ____________________ Date Published: 11/13/74

Family Pay Number: __________ Sex: M F (Circle 1)

UNIT PERFORMANCE TEST: VACUUM CLEANERS AND FLOOR POLISHERS

OBJECTIVE 1:

Given a malfunctioning vacuum cleaner and floor polisher, the student will service and repair these appliances so that they function according to the manufacturer's specifications, following safe practices and procedures.

OBJECTIVE 2:

Using appropriate tools and test equipment, the student will calculate and record amperage, voltage, resistance, and wattage of a vacuum cleaner and a floor polisher.

TASK:

The student will service and repair a malfunctioning vacuum cleaner and a floor polisher and , in the process, he will take and record amperage, voltage, resistance and wattage readings, using appropriate test equipment.

ASSIGNMENT:

CONDITIONS:

The student will be given a malfunctioning vacuum cleaner and floor polisher (they may be bugged by the instructor or they may be brought in by a customer). He will be required to service and repair these appliances in conditions similar to those in a typical appliance repair shop. He will be allowed to use any and all tools, equipment, service manuals, text books, etc., commonly found in a repair shop. He must complete it in a reasonable length of time with no assistance from the instructor(s) or students.

RESOURCES:

Tools:

- Amprobe RS-3 Rotary Meter (B-A)
- Soldering gun 100 to 140 watt
- Adjustable Wrench
- Nut Driver Set
- Long Nose Pliers
- Diagonal Cutters
- Slip Joint Pliers
- Screwdriver Set
- Phillips Set
- Hex & Spline Wrench Kit
- Vise Grip Plier Model Size 7"
- Utica Electrician's Knife, Standard Size
- 18" Aluminum Level
- 12' Steel Tape
- Punch & Chisel Set, 1/2", 5/8" chisels; 3/16, 3/8, 5/32 punches
- Combination Wrench Set
- Hammer (Ball Peen) 12 oz.
- 10" Channel-lock Plier
- Utility Box
- VOM
- Assortment of wire, fasteners and repair parts
- **Vacuum Cleaner**
- **Floor Polisher**

Printed Material:

- Various Repair Manuals
- Manufacturer's Specification Sheets

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Student: ______________________ **File Code:** 76.02.02.00.A1-5

Date: ______________________ **Date Published:** 11/13/84

Family Pay Number: __________ Sex: M F (Circle 1)

PERFORMANCE CHECKLIST:

OVERALL PERFORMANCE: Satisfactory_____ Unsatisfactory_____

	CRITERION	
	Met	Not Met
Objective 1:		
1. Follows safe practices and procedures.		
Criterion: No injury results to the student or the equipment and		
complies with OSHA requirements.		
2. Follows proper procedures for disassembly.		
Criterion: No damage results to the appliance.		
3. Diagnosis and troubleshoots malfunctions properly.		
Criterion: When repaired, the appliance functions according to the		
manufacturer's specifications.		
4. Reassembles the appliance properly.		
Criterion: Appliance functions according to the manufacturer's		
specifications and the procedures followed agree with those		
described in the service literature.		
5. The repaired appliance is repaired in a neat,		
professional manner.		

(Checklist continued)

	CRITERION	
	Met	Not Met
Criterion: No damage results to the appliance such as scratches and dents.		
6. All connections and fastenings are properly completed.		
Criterion: The appliance connection complies with the manufacturer's		
specifications. The connection is mechanically fastened and		
structurally sound. The connection is electrically fastened and		
free of defects.		
7. Appliance functions according to the manufacturer's		
specifications.		
Criterion: Manufacturer's specifications.		
8. Uses appropriate repair part and supplies.		
Criterion: They match exactly those listed in the		
manufacturer's specifications.		
Objective 2:		
9. Uses test equipment properly.		
Criterion: Manufacturer's specifications.		
10. Wattage readings are accurate.		
Criterion: Manufacturer's specifications.		
11. Voltage readings are accurate.		
Criterion: Manufacturer's specifications.		
12. Amperage readings are accurate.		

(Checklist continued)

	CRITERION	
	Met	Not Met
Criterion: Manufacturer's specifications.		
13. Resistance readings are accurate.		
Criterion: Manufacturer's specfficatlons.		
14. When applicable mathematical calculations are correct.		
Criterion: AC/DC Circuit Manuals, Westinghouse.		
15. The appliance is repaired in a reasonable time.		
Criterion: Not to exceed 2 hours.		
The student must successfully complete 13 out of 15 line items		
to achieve an overall score of satisfactory.		

File Code: 76.02.03.00.A2-1

Date Published: 9-12-75

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Learning Experience Guide

UNIT: WASHING MACHINES

RATIONALE:

Every appliance service person is expected to service and repair various types of washing machines. An effective service person must understand how a particular appliance works. It takes a great deal of a skill and understanding to be a proficient service person.

PREREQUISITES:

Unit:	76.02.02	Vacuum Cleaners and Floor Polishers
Unit:	77.01.10	Capacitance

OBJECTIVES:

Operate, disassemble, diagnose malfunctions, repair, service and replace component parts, and reassemble a washing machine, using service manuals and tools.

Identify washing machine characteristics of operation and component parts.

Identify the procedures for diagnosis, repair and service of washing machines.

RESOURCES:

Printed Materials

Appliance Service Manuals for appliances used in the program.
Catalogs, appliance supply (assortment).
Home Appliance Servicing. Edwin P. Anderson, 2nd Edition, Theodore Audel and Company, Indianapolis, Indiana, 1965.
Order forms.
Work order forms.
Manufacturer's specification sheets.

Principal Author(s): T. Ziller

Equipment

Washer, clothes, automatic.

TEST EQUIPMENT: Amprobe (RS-3 Rotary Meter B-A).
Meter, Volt-ohm.

Tools:

Box, utility.
Chisels, (½" and 5/8).
Cutters, diagonal.
Gun, Soldering(100-140 watt).
Hammer, ball pen (12 oz).

Kit, solderless terminal.
Knife, electricians.
Level, aluminum 18".

Nut driver set.
Pliers, channel-lock (10").
Pliers, long nose.
Plier, slip joint.
Plier, vise grip (size 7").
Puncher (3/16", 3/8" & 5/32).

Screwdriver, blade (set).
Screwdriver, Phillips (set).
Tape, steel measuring (12 ft.).
Wrench, adjustable.
Wrench, combination set.
Wrench, hex & spline (kit).

GENERAL INSTRUCTIONS:

This unit consists of four Learning Activity Packages (LAPs). Each LAP will provide specific information for completion of a learning acitivity.

The general procedure for this unit is as follows:

(1) Read the first assigned Learning Activity Package (LAP).
(2) Begin and complete the first assigned LAP.
(3) Take and score the LAP test.
(4) Turn in the LAP test answer sheet.
(5) Determine the reason for any missed items on the LAP test.
(6) Proceed to and complete the next assigned LAP in the unit.
(7) Complete all required LAPs for the unit by following steps 3 through 6.
(8) Take the unit tests as described in the Unit LEG "Evaluation Procedures".
(9) Proceed to the next assigned unit.

PERFORMANCE ACTIVITIES:

.01 Operation of an Electric Washing Machine
.02 Disassembly of an Electric Washing Machine
.03 Diagnosis of Malfunctions in an Electric Washing Machine
.04 Repair, Service and Reassembly of an Electric Washing Machine

EVALUATION PROCEDURE:

When pretesting:

1. The student takes the unit multiple-choice pretest.
2. Successful completion is 4 out of 5 items for each LAP part of the pretest.
3. The student then takes a unit performance test if the unit pretest was successfully completed.
4. Satisfactory completion of the performance test is meeting the criteria listed on the performance test.

When post testing:

1. The student takes a multiple-choice unit post test and a unit performance test.
2. Successful unit completion is meeting the listed criteria for the performance test.

FOLLOW-THROUGH

After reading this unit guide, obtain the LAP for the first assigned performance activity.

Student: ______________________ File Code: 76.02.03.00.A2-2

Date: ______________________ Date Published: 11-18-74

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UNIT PRETEST: WASHING MACHINES

76.02.03.01.

1. The main function of the gear assembly in an agitator-type washer is:

   a. to convert the rotary motion of the motor shaft into the oscillatory motion.
   b. to convert to a mechanical ratio of 2:1.
   c. to make an electrical connection to the timer assembly.
   d. to control the water valve assembly.

2. The purpose of the washing machine flow-washer is to:

   a. agitate the clothes in a circulating motion.
   b. recirculate water at 20 to 120 pounds pressure.
   c. adjust fill-level of water in the tub.
   d. maintain the same water flow into the tub with a variable tap pressure of from 20 to 120 pounds.

3. Name the washer fill valve that has two inlets that lead to a common mixing chamber allowing three temperatures of water.

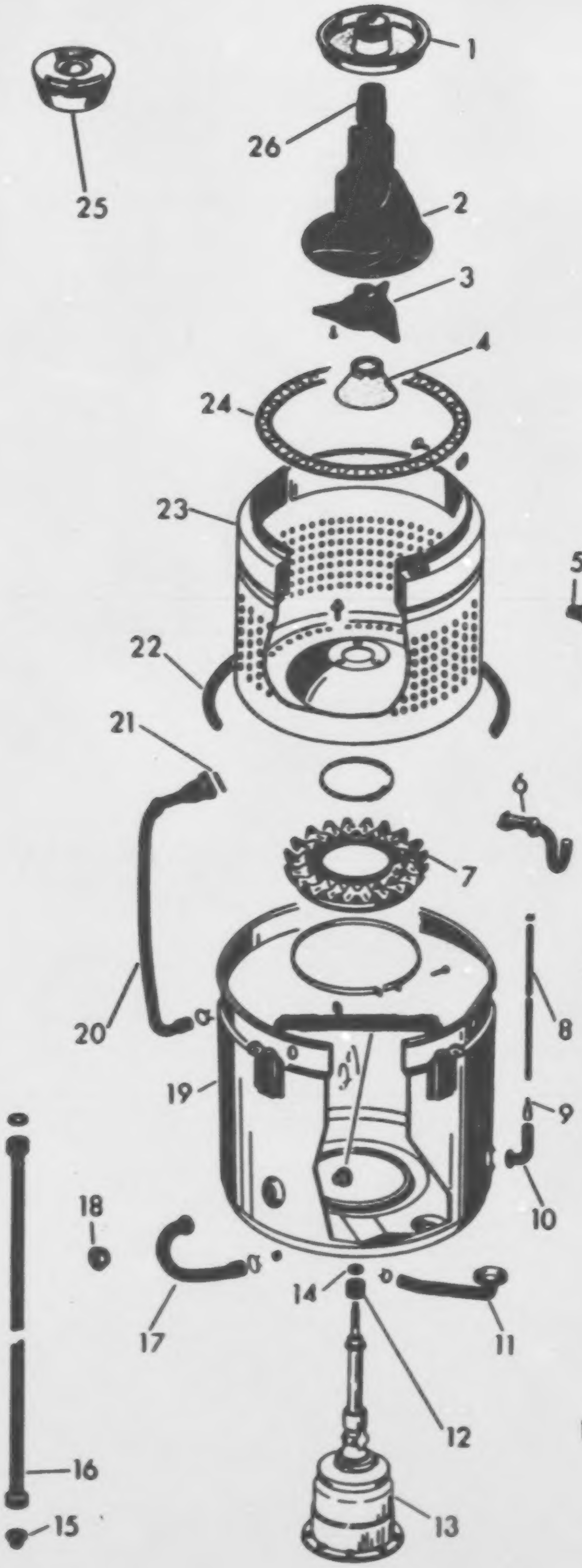
   a. single solenoid non-thermostatic.
   b. triple solenoid non-thermostatic.
   c. double solenoid non-thermostatic.
   d. double solenoid thermostatic.

4. The function of the washer check valve is:

   a. controlling the timer that runs the machine.
   b. checking the water level in the tub.
   c. prevent back flow from the hot water into the cold water line.
   d. bypassing the high pressure in the hot water line.

5. The motor of a washing machine may be connected to the various assemblies:

   a. directly or by belt-and-pulley.
   b. by worm gear.
   c. gear driven.
   d. bias gear driven.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13

WASHER Fig. 7

76.02.03.02.

6. What number below identifies the basket boat as shown in Fig. 7 of an automatic washer?

   a. 4
   b. 3
   c. 7
   d. 9

7. What number below identifies the tub gasket as shown in Fig. 7 of an automatic washer?

   a. 25
   b. 24
   c. 23
   d. 22

8. What number below identifies the mechanical boot as shown in Fig. 7 (automatic washer)?

   a. 7
   b. 19
   c. 22
   d. 4

9. What number below indicates the drain pump inlet as shown in Fig. 7 (automatic washer)?

   a. 17
   b. 11
   c. 9
   d. 8

10. What number below indicates the agitator support as shown in Fig 7 (automatic washer)?

    a. 12
    b. 14
    c. 3
    d. 2

76.02.03.03.

11. If one solenoid coil on a washing machine reads lower ohms when using an ohmmeter:

    a. it is normal.
    b. it is open and needs to be replaced.
    c. it is shorted and must be rcplaced.
    d. it is a constant valve.

76.02.03.03. (continued)

12. Place small series light across hot water solenoid terminals on a washing machine; no light indicates:

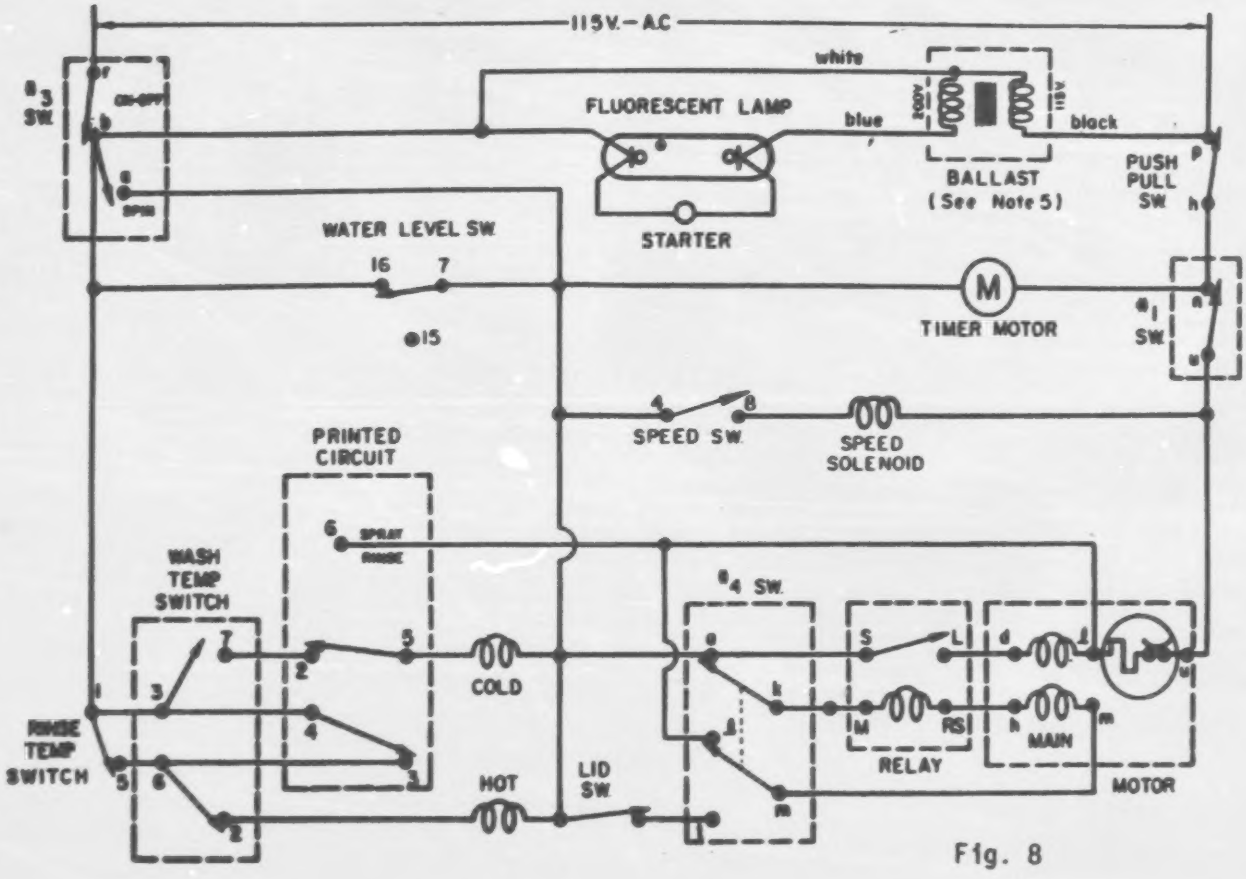
    a. current is reaching the valve and solenoid.
    b. current is not reaching the valve and the timer is probably defective.
    c. current is reaching solenoid but valve is probably defective.
    d. current is reaching the valve and timer is defective.

13. Check with test lamp for voltage at washing machine switch ;if lamp lights:

    a. current is reaching switch; replace switch.
    b. current is not reaching switch; defective timer.
    c. current is reaching solenoid; valve is probably defective.
    d. current is reaching valve; timer defective.

14. If there is an open blue lead (Fig. 8) to the ballast transformer on a washing machine:

    a. ballast transformer is inoperative.
    b. fluorescent lamp is inoperative.
    c. white lead is shorted.
    d. push-pull switch open.


115V.—AC
#3 SW.
ON-OFF
SPIN
white
FLUORESCENT LAMP
blue
200V
115V
black
BALLAST
(See Note 5)
PUSH PULL SW
STARTER
WATER LEVEL SW.
16
7
15
M
TIMER MOTOR
#1 SW.
4
8
SPEED SW.
SPEED SOLENOID
PRINTED CIRCUIT
6
SPRAY
RINSE
WASH TEMP SWITCH
#4 SW.
RELAY
S
L
M
RS
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MAIN
MOTOR
COLD
HOT
LID SW.
RINSE TEMP SWITCH
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3
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Fig. 8

76.02.03.03. (continued)

15. If the washing machine lid switch relay (Fig 8) is open:

    a. the main motor would not operate.
    b. the main motor would be shorted.
    c. the lid switch would be open.
    d. the lid switch relay would be shorted.

76.02.03.04.

16. High wattage with washing machine pump operating will indicate:

    a. a bad solenoid.
    b. a bad relay.
    c. an obstruction in the pump or water connections.
    d. a broken hot lead.

17. To check the vibration limit switch, remove both wires and place continuity tester leads in the terminal; a light indicates:

    a. switch circuit has a loose connection.
    b. the switch is open.
    c. switch circuit is okay.
    d. the arm is in the up position, the switch is shorted and must be replaced.

18. If the washing machine agitator shaft can be moved back and forth:

    a. the bearings are worn and the seal requires replacement.
    b. shaft must be replaced.
    c. bearing housing is out of round.
    d. bearings require packing.

19. If washer tub turns during agitation, or takes longer than normal to stop the basket-or if it squeaks:

    a. cycle timer needs replacing.
    b. motor wirings are potentially shorted.
    c. the band and brake mechanism should be checked for replacement.
    d. timer circuit has a loose terminal.

20. If the washer thermal overload switch is opening the motor switch:

    a. the trouble may be due to poor ventilation.
    b. never reset the switch until the trouble has been repaired.
    c. permit the motor to cool, then reset the overload switch.
    d. the motor has trouble in the starting circuit.

UNIT TEST ANSWER SHEET

PRETEST

Occupational Area: ______
File Code: 76.02.03.00.A2-2
Name: ______

ANSWERS

LAP 01	1.	A	21.		41.	
	2.	D	22.		42.	
	3.	C	23.		43.	
	4.	C	24.		44.	
	5.	A	25.		45.	
LAP 02	6.	A	26.		46.	
	7.	D	27.		47.	
	8.	A	28.		48.	
	9.	B	29.		49.	
	10.	A	30.		50.	
LAP 03	11.	C	31.		51.	
	12.	B	32.		52.	
	13.	A	33.		53.	
	14.	B	34.		54.	
	15.	A	35.		55.	
LAP 04	16.	C	36.		56.	
	17.	D	37.		57.	
	18.	A	38.		58.	
	19.	C	39.		59.	
	20.	C	40.		60.	

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File Code: 76.02.03.01.A2-0

Date Published: 9-12-75

Learning Activity Package

Student: ____________________

Date: ____________________

PERFORMANCE ACTIVITY: Operation of an Electric Washing Machine

OBJECTIVE:

Describe the operation of an electric washing machine.

Identify the operational characteristics of an electric washing machine.

Draw a schematic diagnosis of the electrical circuit for the washing machine.

EVALUATION PROCEDURE:

Student is to write a description about the operation of an electric washing machine that is consistent with the attached checklist.

Successfully complete at least 80% of the items on a multiple-choice test about this LAP.

RESOURCES:

Checklist; Operation of an Electric Washing Machine.
Washing Machine.
Home Appliance Servicing, Anderson.

PROCEDURE:

1. Read pages 342-404 in Home Appliance Servicing.

2. Follow the steps on the attached checklist; Operation of an Electric Washing Machine.

3. Write a description of the operation of an electric washing machine using simple schematic diagrams.

4. Complete the multiple-choice test items for this LAP.

5. Check your answers with the test key. If your answers are all correct, record your time for completing this LAP on your SPR. If you have missed any questions, try to find out why you missed the test items. If you have any further problems, check with your instructor. When you have correctly completed all the test items, you may record your time on your SPR.

Principal Author(s): T. Ziller

CHECKLIST: OPERATION OF AN ELECTRIC WASHING MACHINE

____ 1. Check all controls for "off" position.

____ 2. Connect to water, electrical, sewer outlets.

____ 3. Turn the hot and cold water facets to "on".

____ 4. Select the first timer setting, turn on and let operate.

NOTE: The fill cycle takes about 2½ min.; wash, 10-15 min.; drain, 2½ min.; spin, 2½ min.; brake, 2½ min.; rinse, 2½ min.; drain, 2½ min.; spin, 5 min.; and brake, 2½ min. (approximate values).

____ 5. Select another timer setting.

NOTE: Timer-motor advances causing a cam device to close or open a number of switches.

____ 6. Turn timer off at the end of the complete cycle.

____ 7. Turn on lighting circuits (if any).

____ 8. Check alarm system.

____ 9. Turn washing machine to "off"; disconnect from a utility outlet.

Student: ______________________ File Code: 76.02.03.01.A2-2

Date: ______________________ Date Published 7/28/75

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LAP TEST: OPERATION OF AN ELECTRIC WASHING MACHINE

1. Timers that use cam-operated contacts to control the washer throughout the cycle of operation:

   a. are used only in the pulsator type of washer.
   b. do not use a separate motor, but instead use the washer motor.
   c. always have synchrounous motor to operate the cam system.
   d. may use the washer motor or a small synchronous motor to operate the cam system.

2. When the washer mixer is functioning properly, and the water temperature selector switch is set on warm, the temperature of the water should be about:

   a. 212° F.
   b. 140° F.
   c. 98° F.
   d. 100° F.

3. The purpose of the washing machine flow-washer is to:

   a. agitate the clothes in a circulating motion.
   b. recirculate water at 20 to 120 pounds pressure.
   c. adjust fill-level of water in the tub.
   d. maintain the same water flow into the tub with a variable tap pressure of from 20 to 120 pounds.

4. A function of the washer pump is to:

   a. recirculate water.
   b. operate transmission, to turn the agitator.
   c. fill the machine by energizing the fill-valve solenoid.
   d. adjust fill level of water in the tub.

5. A function of the washer timer is to:

   a. engage clutch drives.
   b. fill the machine by energizing the fill valve solenoid.
   c. open hot and cold fill valves to provide proper water temperature.
   d. shift gears in transmissions.

6. A function of the washer solenoids is to:

   a. adjust fill level of water in tub.
   b. operate transmission, to turn the agitator.
   c. turn a pulley to spin the tub.
   d. open hot and cold fill valves to provide proper water temperature.

7. A function of the washer motor is to:

   a. fill the machine by energizing the fill valve solenoid.
   b. control speed of motor drives.
   c. control water temperature.
   d. operate transmission, to turn the agitator.

8. A function of the washer switches is to:

   a. control water temperature.
   b. operate transmission, to turn the agitator.
   c. lock lids for spin.
   d. engage clutch drives.

9. Name the washer fill valve that has two inlets that lead to a common mixing chamber allowing three temperatures of water.

   a. single solenoid non-thermostatic.
   b. triple solenoid thermostatic.
   c. double solenoid non-thermostatic.
   d. double solenoid thermostatic.

10. The motor of a washing machine may be connected to the various assemblies:

   a. directly or by belt-and-pulley.
   b. by worm gear.
   c. gear driven.
   d. bias gear driven.

LAP TEST ANSWER KEY: OPERATION OF AN ELECTRIC WASHING MACHINE

1. C
2. B
3. D
4. A
5. B
6. D
7. D
8. A
9. C
10. A

File Code: 76.02.03.02.A2-0

Date Published: 9-12-75

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Learning Activity Package

Student: ____________________

Date: ____________________

PERFORMANCE ACTIVITY: Disassembly of an Electric Washing Machine

PROCEDURE:

Disassemble an electric washing machine.

Identify component parts of electric washing machines.

EVALUATION PROCEDURE:

Instructor will examine the disassembled appliance for correct disassembly and parts identification in accordance with the attached checklist.

Successfully complete at least 80% of the items on a multiple-choice test about this LAP.

RESOURCES:

Checklist: Disassembly of an Electric Washing Machine.
Tools and electric washing machine.
Service Manuals for the appliance.

PROCEDURE:

1. Follow the steps on the attached checklist: Disassembly of an Electric Washing Machine.
2. Complete the multiple-choice test items for this LAP.
3. Check your answers with the test key. If your answers are all correct, record your time for completing this LAP on your SPR. If you have missed any questions, try to find out why you missed the test items. If you have any further problems, check with your instructor. When you have correctly completed all the test items, you may record your time on your SPR.

Principal Author(s): T. Ziller

CHECKLIST: DISASSEMBLY OF AN ELECTRIC WASHING MACHINE

_____ 1. Unplug pigtail (line cord) from power source.
_____ 2. Unscrew and remove cabinet back
_____ 3. Disconnect and remove motor (identifying wiring connections).
_____ 4. Remove timer mechanism (identify all wires).
_____ 5. Remove water control mixing valve (identify all wires).
_____ 6. Uncouple and remove geat case assembly.
_____ 7. Remove door seal and tub assembly.
_____ 8. Remove basket support and clutch-drive assembly from tub.
_____ 9. Disconnect and remove drain valve from tub.
_____ 10. Identify and label the parts.
_____ 11. Have the instructor check identifications.

Student: ______________________ File Code: 76.02.03.02.A2-2

Date: ______________________ Date Published: 7/28/75

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Glasgow AFB, Montana 59231

LAP TEST: DISASSEMBLY OF AN ELECTRIC WASHING MACHINE

1. In Fig. 7 of an automatic washer what number below identifies the clothes retainer?

   a. 23
   b. 24
   c. 4
   d. 22

2. What number below identifies the agitator as shown in Fig. 7 (automatic washer)?

   a. 2
   b. 3
   c. 4
   d. 1

3. In Fig. 7 of an automatic washer, what number below identifies the basket and ring assembly?

   a. 22
   b. 23
   c. 19
   d. 2

4. What number below identifies the nozzle brace as shown in Fig. 7 (automatic washer)?

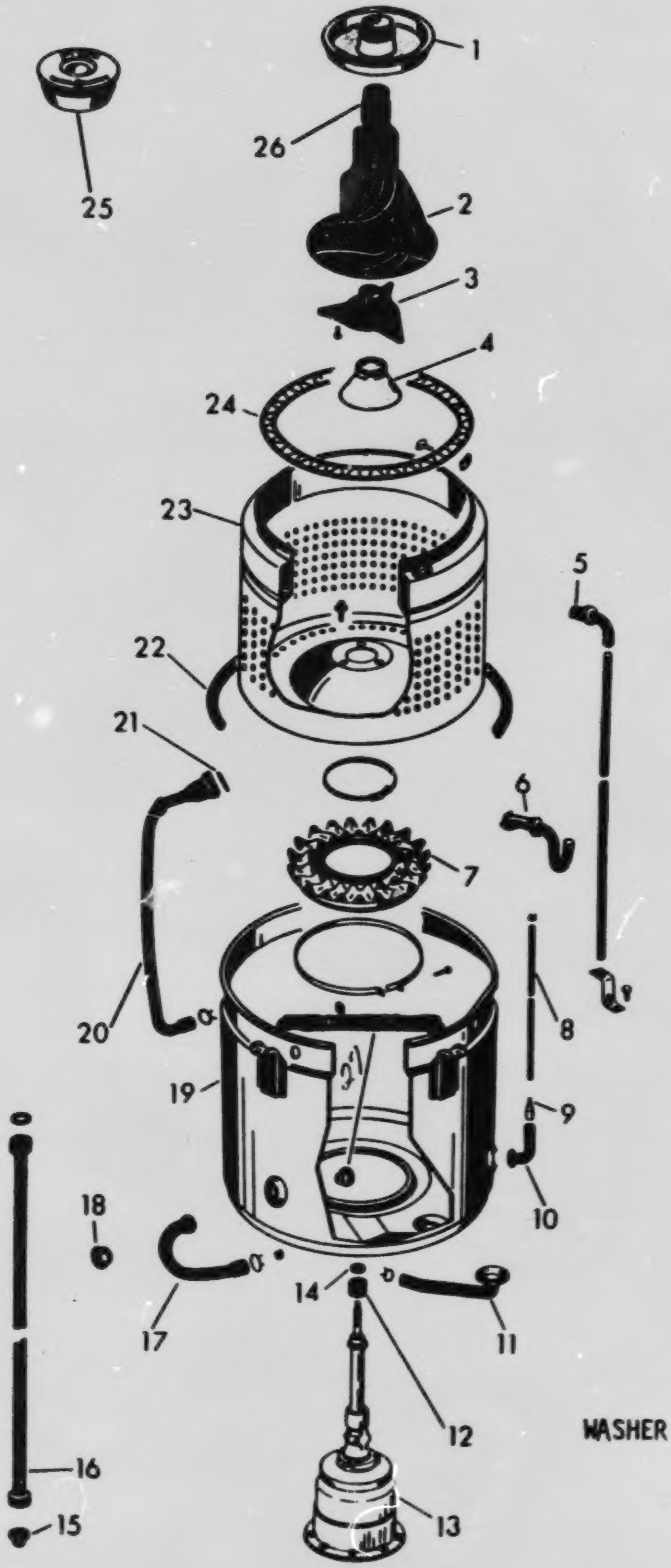
   a. 21
   b. 9
   c. 14
   d. 15

5. In Fig. 7 of an automatic washer, what number below identifies the recirculation hose?

   a. 20
   b. 5
   c. 6
   d. 17

6. What number below identifies the tub gasket as shown in Fig. 7 of an automatic washer?

   a. 25
   b. 24
   c. 23
   d. 22


1
26
25
2
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21
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9
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18
17
14
11
12
16
13
15

WASHER Fig. 7

LAP TEST ANSWER KEY: DISASSEMBLY OF AN ELECTRIC WASHING MACHINE

1. B
2. A
3. B
4. A
5. A
6. D
7. B
8. C
9. A
10. A

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File Code: 76.02.03.03.A2-0

Date Published: 9-12-75

Learning Activity Package

Student: ____________________

Date: ____________________

PERFORMANCE ACTIVITY: Diagnosis of Malfunctions in an Electric Washing Machine

OBJECTIVE:

Diagnose malfunctions in an electric washing machine following the recommended procedures and using appropriate tools.

EVALUATION PROCEDURE:

Electrical values found during diagnosis are consistent with specifications found on the manufacturer's name plate.

Successfully complete at least 80% of the items on a multiple choice test about this LAP.

RESOURCES:

Checklist: Diagnosis of Malfunctions Electric Washing Machine.
Tools, test equipment, work order form and electric washing machine.
Service Manuals for the appliance.

PROCEDURE:

1. Follow the steps on the attached checklist: Diagnosing Malfunctions - Electric Washing Machine.
2. Complete the multiple-choice test items for this LAP.
3. Check your answers with the test key. If your answers are all correct, record your time for completing this LAP on your SPR. If you have missed any questions, try to find out why you missed the test items. If you have any further problems, check with your instructor. When you have correctly completed all the test items, you may record your time on your SPR.

Principal Author(s): Y. Ziller

CHECKLIST: DIAGNOSIS OF MALFUNCTIONS--ELECTRIC WASHING MACHINE

_____ 1. Make a thorough visual inspection of appliance.

_____ 2. Check line cords, pigtails, etc. (Ohmmeter).

_____ 3. Check power switches and electrical controls (Ohmmeter).

_____ 4. Check interlocks, equipment fuses and breakers (Ohmmeter).

_____ 5. Check motor (Growler and Ohmmeter).

_____ 6. Check for defective motor brushes and bearings.

_____ 7. Check contacts and thermostats.

_____ 8. Check relays and valves.

_____ 9. Check gear-boxes, gears and pumps.

_____ 10. Check timer mechanisms.

_____ 11. Refer to service manual for specific equipment data.

_____ 12. Plug appliance into 115V AC source.

_____ 13. Check voltage source (Voltmeter). Record values _____

_____ 14. Check current (Amprobe). Record values _____

_____ 15. Compare values with manufacturer's specifications.

Student: ______________________ **File Code:** 76.02.03.03.A2-2

Date: ______________________ **Date Published:** 7/28/75

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LAP TEST: DIAGNOSIS OF MALFUNCTIONS IN AN ELECTRIC WASHING MACHINE

1. If the washing machine tub overflows, check to see if:

   a. the water level switch stuck closed.
   b. there is a defective water valve solenoid(s).
   c. the water valve plunger is stuck open.
   d. there is a clogged water valve screen.

2. If there is no spin on a washing machine, a possible cause is:

   a. the transmission clutch spring is slipping.
   b. the lid switch is defective or out of adjustment.
   c. the drive belt is loose.
   d. the clutch primary shoes are slipping.

3. If you receive a shock when you touch the washer:

   a. one of the current-carrying conductors is touching the frame.
   b. you should ground the frame properly.
   c. the trouble maybe static electricity.
   d. it will blow a fuse if you install a good ground.

4. If one solenoid coil on a washing machine reads lower ohms when using an ohmmeter:

   a. it is normal.
   b. it is open and needs to be replaced.
   c. it is shorted and must be replaced.
   d. it is a constant valve.

5. Place small series light across hot water solenoid terminals on a washing machine; no light indicates:

   a. current is reaching the valve and solenoid.
   b. current is not reaching the valve and the timer is probably defective.
   c. current is reaching solenoid but valve is probably defective.
   d. current is reaching the valve and timer is defective.

6. If a washing machine pump is leaking:

   a. check for defective impeller.
   b. check for cracked case or loose bolts.
   c. check for obstruction in pump.
   d. check for worn bearings.

7. A defective washing machine pump requires:

   a. replacement with a new rebuilt pump.
   b. field repair.
   c. replacement of seals and bearings only.
   d. replacement of shaft and bearings only.

8. Set washing machine timer to rinse-fill position and check cold water solenoid with voltmeter; a light indicates:

   a. current is reaching solenoids but valve is not operating.
   b. current is reaching the valve and solenoid.
   c. current is reaching the solenoid but timer is probably defective.
   d. current is not reaching solenoids.

9. If there is an open blue lead (Fig. 8) to the ballast transformer on a washing machine:

   a. ballast transformer is inoperative.
   b. fluorescent lamp in inoperative.
   c. white lead is shorted.
   d. push-pull switch open.

10. If there is a shorted cold solenoid lead (Fig. 8) on a washing machine there is:

    a. hot water only.
    b. cold water at cold setting only.
    c. cold water at all settings.
    d. warm water at warm water setting.

Figure 8 on following page.

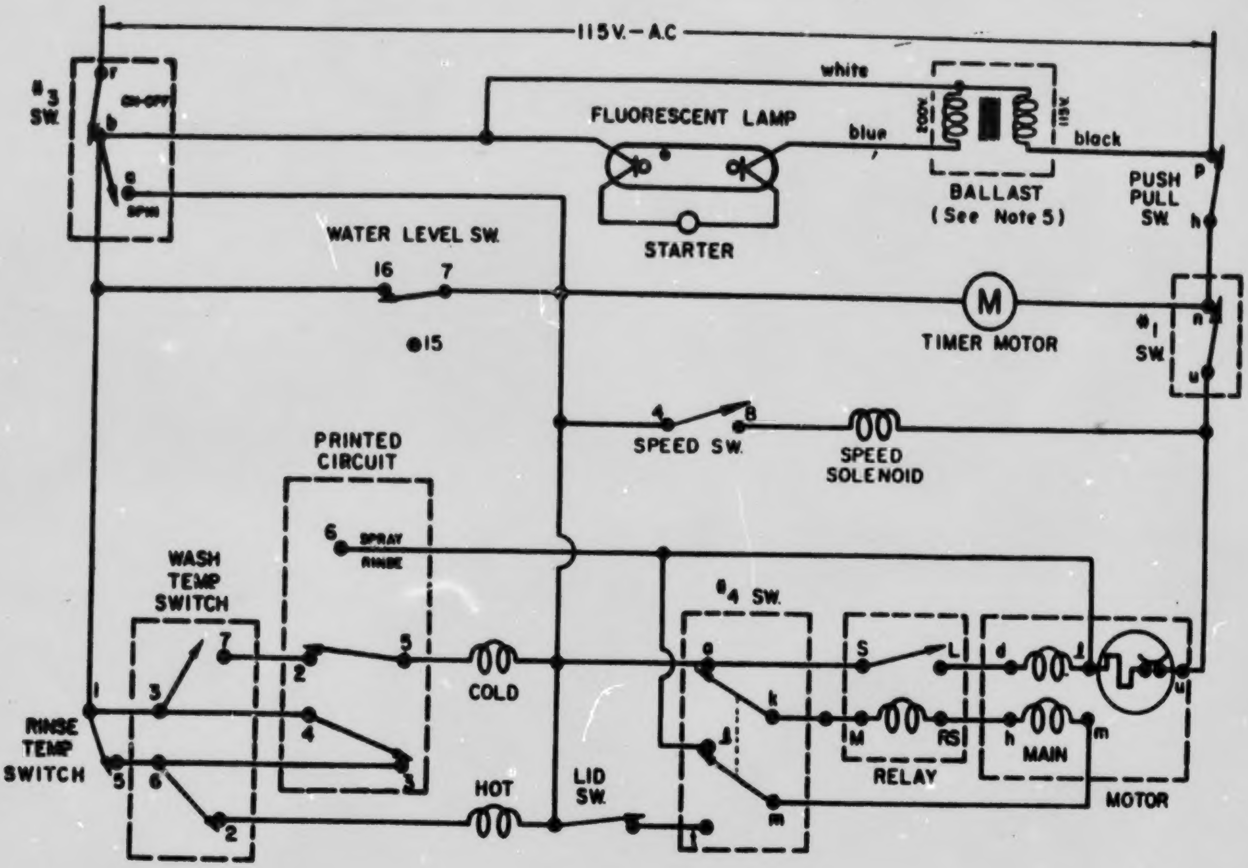
115V.—A.C
#3 SW.
ON-OFF
SPIN
white
blue
black
FLUORESCENT LAMP
STARTER
BALLAST
(See Note 5)
200V
115V
PUSH PULL SW.
p
h
WATER LEVEL SW.
16
7
15
M
TIMER MOTOR
#1 SW.
4
8
SPEED SW.
SPEED SOLENOID
PRINTED CIRCUIT
6
SPRAY
RINSE
WASH TEMP SWITCH
RINSE TEMP SWITCH
COLD
HOT
LID SW.
#4 SW.
S
L
M
RS
RELAY
MAIN
MOTOR
1
2
3
4
5
6
7

Fig. 8

LAP TEST ANSWER KEY: DIAGNOSIS OF MALFUNCTIONS IN AN ELECTRIC WASHING MACHINE

1. C
2. B
3. A
4. C
5. B
6. B
7. A
8. A
9. B
10. C

File Code: 76.02.03.04.A2-0

Date Published: 9-12-75

Mountain-Plains Education &
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Glasgow AFB, Montana 59231

Learning Activity Package

Student: ____________________

Date: ____________________

PERFORMANCE ACTIVITY: Repair, Service and Reassembly of an Electric Washing Machine

OBJECTIVE:

Repair, service and reassemble an electric washing machine.

Order replacement parts for the washing machine.

EVALUATION PROCEDURE:

Appliance must operate properly.

Successfully complete at least 80% of the items on a multiple-choice test about this LAP.

RESOURCES:

Checklist: Repair, Service and Reassembly Electric Washing Machine.
Test equipment, tools, appliance parts catalogs and requisition form.
Electric washing machine.
Service manuals for the appliance.

PROCEDURE:

1. Follow the steps on attached checklist: Repair, Service and Reassembly - Electric Washing Machine.

2. Complete the multiple-choice test items for this LAP.

3. Check your answers with the test key. If your answers are all correct, record your time for completing this LAP on your SPR. If you have missed any questions, try to find out why you missed the test items. If you have any further problems, check with your instructor. When you have correctly completed all the test items, you may record your time on your SPR.

Principal Author(s): T. Ziller

CHECKLIST: REPAIR, SERVICE AND REASSEMBLY--ELECTRIC WASHING MACHINE

Repair & Service:

_____ 1. If power cord has an open or a short or is frayed and worn; repair or replace.

_____ 2. If timer motor has an open or short in its field, replace.

_____ 3. If the timer's switch contacts are pitted, file.

_____ 4. If timer switches are inoperative, replace switch or cam device.

_____ 5. If the lid switch is faulty, replace.

_____ 6. If the water level tube or switch is not functioning, clean and/or replace.

_____ 7. If water control solenoids are jammed or has a short or an open winding, clean and/or replace.

_____ 8. If any water hoses are damaged and are leaking water, repair or replace.

_____ 9. If any electrical wires, connectors or terminals are frayed, corroded, worn or broken; repair or replace with same wire type, gauge and color code.

_____ 10. If the electric motor has an open, short of is grounded; repair or replace.

_____ 11. If the transmission is damaged, repair or replace.

_____ 12. If the transmission needs lubrication, check service manuals for types of recommended lubricants.

_____ 13. If bearings are dry or worn, lubricate or replace.

Reassemble:

_____ 1. Place bearings on drive shaft and insert into tub enclosure (see service manual for exploded view).

_____ 2. Replace all water seals and gaskets.

_____ 3. Attach drive to transmission and mount to washer frame.

_____ 4. Connect all hoses and attach hose clamps.

_____ 5. Connect all electric wires to their proper terminals (use wire diagram).

_____ 6. Insert basket and mount.

_____ 7. **Replace aggitator and accessories.**

_____ 8. **Replace all access panels.**

_____ 9. Connect to water and electricity.

_____ 10. Check for leaks.

Student: ______________________ File Code: 76.02.03.04.A2-2

Date: ______________________ Date Published: 7/28/75

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LAP TEST: REPAIR, SERVICE AND REASSEMBLY OF AN ELECTRIC WASHING MACHINE

1. If the electrical circuit to the washer is not complete causing rinse water to not enter basket during rinse cycle:

   a. vibration limit switch closed, and must be replaced.
   b. motor protector is closed and must be replaced.
   c. cover lid spin is closed and must be replaced.
   d. cover lid spin switch is open and must be replaced.

2. Place test lamp across solenoid coil terminals on washing machine; a light indicates:

   a. replace solenoid contacts.
   b. coil defective; replace.
   c. replace solenoid fixed magnets.
   d. operation is normal; replace solenoid switch.

3. Check receptacle to washing machine with a test light; a light indicates:

   a. open circuit from fuse box; correct.
   b. closed circuit.
   c. shorted circuit.
   d. grounded circuit.

4. After replacing the washing machine pump:

   a. adjust belt so it is loose.
   b. adjust belt so that it is rigid.
   c. adjust so that there is a slip in the drive.
   d. adjust so that there is no slip in the drive.

5. Before installing an electric washer, you should become familiar with:

   a. operation of washing machine.
   b. service manual chart.
   c. local code requirements.
   d. UL is on the washer.

6. If the water pressure exceeds 120 pounds, what must be done when an automatic washer is installed?

   a. a float must be installed.
   b. a pressure-relief valve must be installed.
   c. a pressure-regulating valve must be installed.
   d. an electronic switch must be connected to the pipe system.

7. High wattage with washing machine pump operating will indicate:

   a. a bad solenoid.
   b. a bad relay.
   c. an obstruction in the pump or water connections.
   d. a broken hot lead.

8. Remove harness leads from washing machine motor and attach testing cord to motor and test. If motor runs:

   a. motor is okay.
   b. motor is burned out.
   c. motor is shorted.
   d. motor is open.

9. If washer tub turns during agitation, or takes longer than normal to stop the basket-or if it squeaks:

   a. cycle timer needs replacing.
   b. motor wirings are potentially shorted.
   c. the band and brake mechanism should be checked for replacement.
   d. timer circuit has a loose terminal.

10. If the washer thermal overload switch is opening the motor switch:

   a. the trouble may be due to poor ventilation.
   b. never reset the switch until the trouble has been repaired.
   c. permit the motor to cool, then reset the overload switch.
   d. the motor has trouble in the starting circuit.

LAP TEST ANSWER KEY: REPAIR, SERVICE AND REASSEMBLY OF AN ELECTRIC WASHING MACHINE

1. D
2. B
3. A
4. D
5. C
6. C
7. C
8. A
9. C
10. C

Student: ____________________ File Code: 76.02.03.00.B2-2

Date: ____________________ Date Published: 11-20-74

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UNIT POST TEST: WASHING MACHINES

76.02.03.01

1. The main function of the gear assembly in an agitator-type washer is:
    - a. to convert the rotary motion of the motor shaft into the oscillatory motion.
    - b. to convert to a mechanical ratio of 2:1.
    - c. to make an electrical connection to the timer assembly.
    - d. to control the water valve assembly.

2. In the cylinder-type washers baffles are used to:
    - a. keep the clothes in one spot during the extraction.
    - b. rotate the clothes.
    - c. control the amount and direction of water flow during the rinse cycle.
    - d. control the air flow into the washing machine.

3. The function of the washer check valve is:
    - a. controlling the timer that runs the machine.
    - b. checking the water level in the tub.
    - c. prevent back flow fron the hot water into the cold water line.
    - d. bypassing the high pressure in the hot water line.

4. What is the size and type of fuse that should be used to protect an automatic washer?
    - a. 20 amp time-relay.
    - b. 15 amp. time-relay.
    - c. micro amp time-relay.
    - d. milli amp time-relay.

5. The motor in a washing machine is commonly what type?
    - a. universal shaded-pole.
    - b. repulsion.
    - c. capacitor-start.
    - d. polyphase.

76.02.03.02.

6. In Fig. 7 of an automatic washer, what number bleow identifies the transmission?

   a. 13
   b. 25
   c. 2
   d. 7

7. In Fig, 7 of an automatic washer, what number below identifies a switch hose?

   a. 6
   b. 8
   c. 20
   d. 11

8. What number identifies the basket boat as shown in Fig. 7 of an automatic washer?

   a. 4
   b. 3
   c. 7
   d. 9

9. In Fig. 7 of an automatic washer, what number below identifies the agitator bearing?

   a. 14
   b. 7
   c. 3
   d. 12

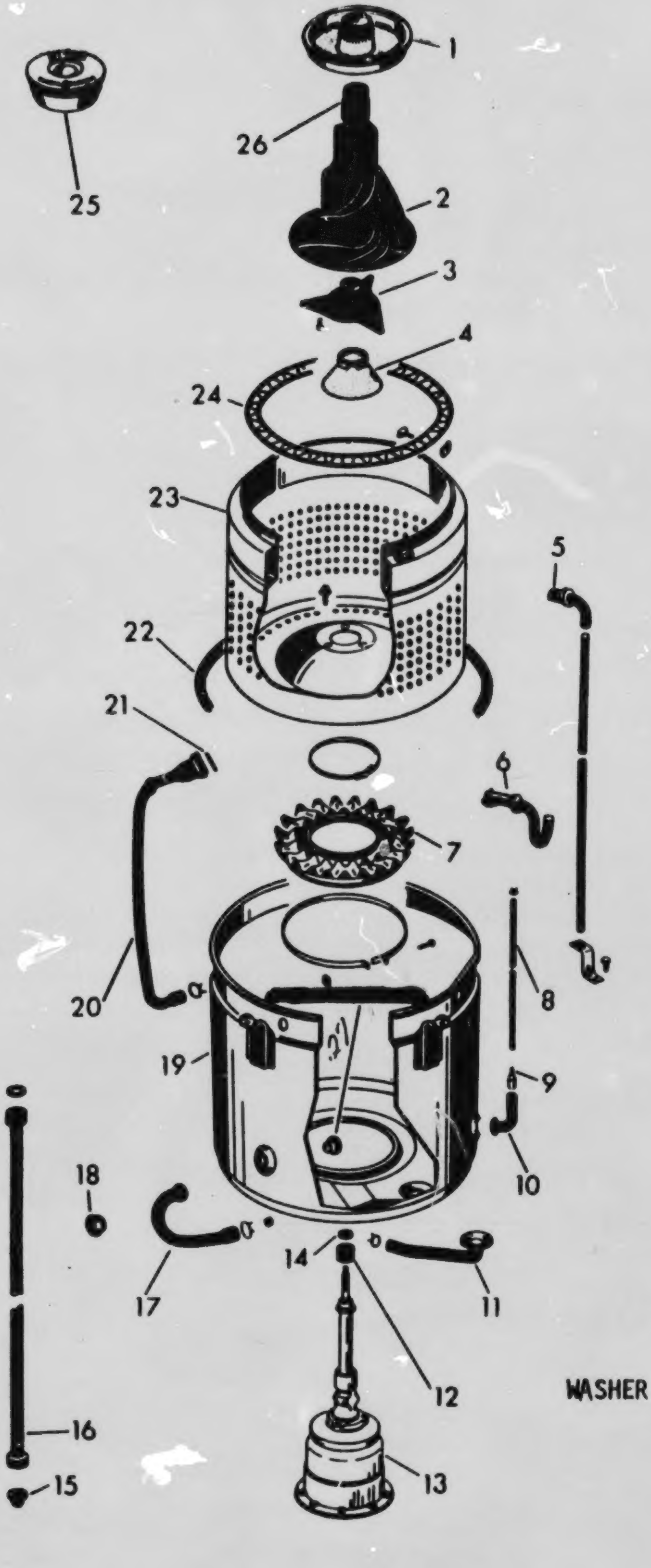
10. What number below indicates the drain pump inlet as shown in Fig. 7 (automatic washer)?

    a. 17
    b. 11
    c. 9
    d. 8

76.02.03.03.

11. If the washing machine water level is too high, a possible cause is:

    a. the water valve plunger is stuck open.
    b. the water level switch is out of calibration.
    c. the water level switch is stuck open.
    d. there is a defective water valve solenoid(s).


1
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25
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24
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17
14
11
12
16
13
15

WASHER Fig. 7

76.02.03.03. (continued)

12. A washer machine valve that leaks with solenoid connections off:

    a. may have a piece of dirt under needle valve.
    b. may have backpressure.
    c. may be shut off.
    d. may be open.

13. If water enters washing machine tub but desired temperature is not supplied:

    a. check for close-circuited wiring harness.
    b. check for open-circuited wiring harness.
    c. check for open valve.
    d. check to see if mixing valve solenoids are "grounded."

14. Check with test lamp for voltage at washing machine switch; if lamp lights:

    a. current is reaching switch; replace switch.
    b. current is not reaching switch; defective timer.
    c. current is reaching solenoid; valve is probably defective.
    d. current is reaching valve; timer defective.

15. If the washing machine lid switch relay (fig. 8) is open:

    a. the main motor would not operate.
    b. the main motor would be shorted.
    c. the lid switch would be open.
    d. the lid switch relay would be shorted.

Illustration on page 5.

76.02.03.04.

16. Place test lamp across solenoid coil terminals on washing machine; a light indicates:

    a. replace solenoid contacts.
    b. coil defective; replace.
    c. replace solenoid fixed magnets.
    d. operation is normal; replace solenoid switch.

17. Low wattage with washing machine pump operating and water tub filled will indicate:

    a. a broken impeller shaft.
    b. a shorted pump motor.
    c. a bad relay switch.
    d. a bad solenoid switch.

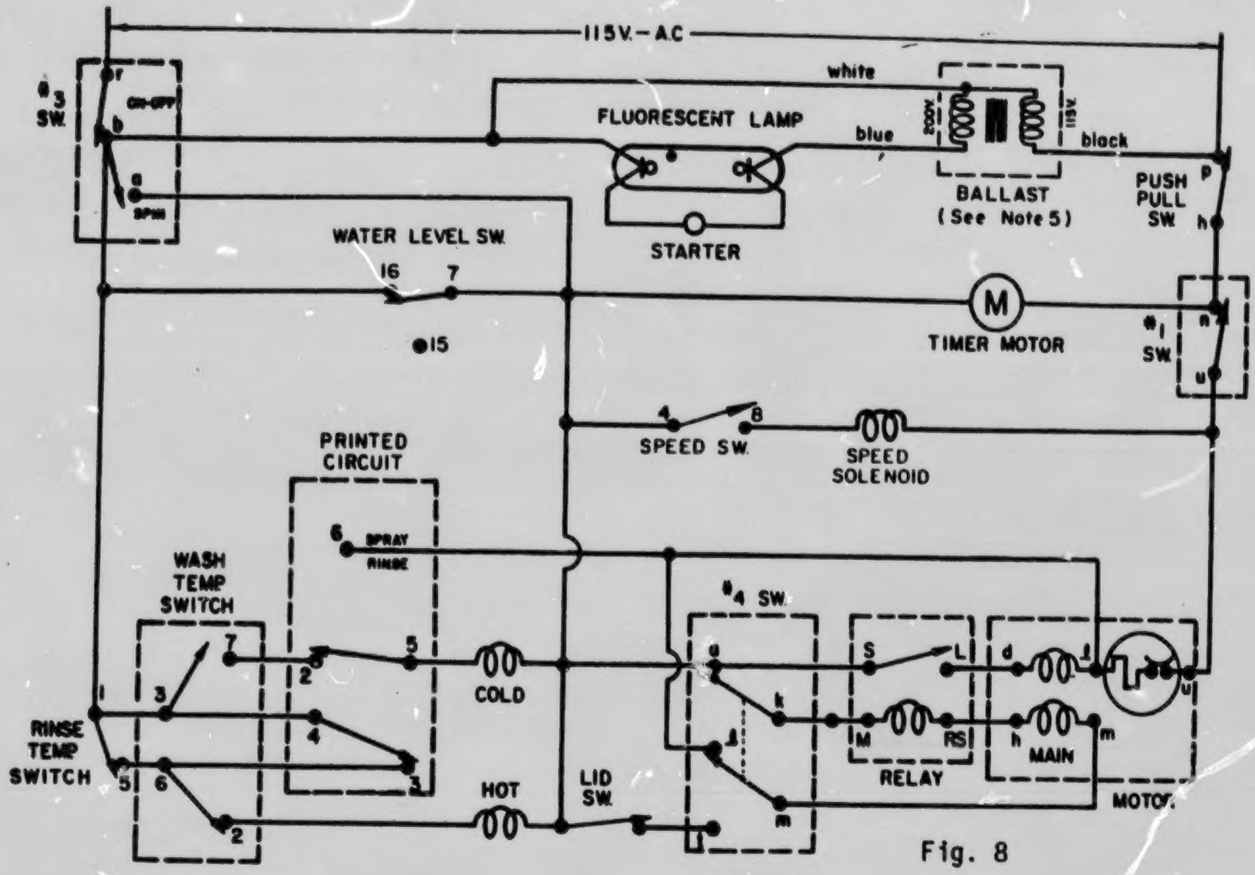
115V.-AC
#3 SW.
ON-OFF
SPIN
r
b
a
white
FLUORESCENT LAMP
blue
200V.
115V.
black
BALLAST
(See Note 5)
STARTER
PUSH PULL SW
p
h
WATER LEVEL SW.
16
7
●15
M
TIMER MOTOR
#1 SW.
n
u
4
8
SPEED SW.
SPEED SOLENOID
PRINTED CIRCUIT
6
SPRAY
RINSE
WASH TEMP SWITCH
7
2
8
5
COLD
#4 SW.
g
k
j
m
S
L
M
RS
RELAY
d
h
MAIN
m
MOTOR
1
3
4
3
RINSE TEMP SWITCH
5
6
2
HOT
LID SW.

Fig. 8

76.02.03.04. (continued)

18. If washing machine basket turns counterclockwise during agitation due to an energized brake solenoid:

    a. there is an open circuit in timer or wiring.
    b. there is a short circuit in timer or wiring.
    c. there is a closed circuit in timer or wiring.
    d. there is a short circuit in the motor windings.

19. To check the vibration limit switch, remove both wires and place continuity tester leads on the terminal; a light indicates:

    a. switch circuit has a loose connection.
    b. the switch is open.
    c. switch circuit is okay.
    d. the arm is in the "up" position, the switch is shorted and must be replaced.

76.02.03.04. (continued)

20. If the washing machine agitator shaft can be moved back and forth:

    a. the bearings are worn and the seal requires replacement.
    b. shaft must be replaced.
    c. bearing housing is out of round.
    d. bearings require packing.

UNIT TEST ANSWER SHEET

Occupational Area: ____
File Code: 76.02.03.00.B2-2
Name: ____

ANSWERS

LAP 01 1. A
2. B
3. C
4. B
5. C
LAP 02 6. A
7. B
8. A
9. C
10. B
LAP 03 11. B
12. A
13. B
14. A
15. A
LAP 04 16. B
17. A
18. B
19. D
20. A

21. ____
22. ____
23. ____
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42. ____
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45. ____
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55. ____
56. ____
57. ____
58. ____
59. ____
60. ____

Student: ______________________ File Code: 76.02.03.00.A1-5

Date: ______________________ Date Published: 11/13/74

Mountain-Plains Education &
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Glasgow AFB, Montana 59231

Family Pay Number: __________ Sex: M F (Circle 1)

UNIT PERFORMANCE TEST: WASHING MACHINES

OBJECTIVE 1:

Given a malfunctioning washing machine, the student will service and repair the machine so that it functions according to the manufacturer's specifications, following safe practices and procedures.

OBJECTIVE 2:

Using appropriate tools and test equipment, the student will calculate and record amperage, voltage, resistance, and wattage of a washing machine.

TASK:

The student will service and repair a malfunctioning washing machine and, in the process, he will take and record amperage, voltage, resistance and wattage readings, using appropriate test equipment.

ASSIGNMENT:

CONDITIONS:

The student will be given a malfunctioning washing machine (it may bugged by the instructor or it may be one brought in by a customer). He will be required to service and repair the washing machine in conditions similar to those in a typical appliance repair shop. He will be allowed to use any and all tools, equipment, service manuals, text books, etc., commonly found in a repair shop. He must complete it in a reasonable length of time with no assistance from the instructor(s) or students.

RESOURCES:

Tools:

- Amprobe RS-3 Rotary Meter (B-A)
- Soldering gun 100 to 140 watt
- Adjustable Wrench
- Nut Driver Set
- Long Nose Pliers
- Diagonal Cutters
- Slip Joint Pliers
- Screwdriver Set
- Phillips Set
- Hex & Spline Wrench Kit
- Vise Grip Plier Model Size 7"
- Utica Electrician's Knife, Standard Size
- 18" Aluminum Level
- 12' Steel Tape
- Punch & Chisel Set, 1/2", 5/8" chisels; 3/16, 3/8, 5/32 punches
- Combination Wrench Set
- Hammer (Ball Peen) 12 oz.
- 10" Channel-lock Plier
- Utility Box
- VOM
- Assortment of wire, fasteners and repair parts
- **Washing Machine**

Printed Material:

- Various Repair Manuals
- Manufacturer's Specification Sheets

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Glasgow AFB, Montana 59231

Student: ______________________ **File Code:** 76.02.03.00.A1-5

Date: ______________________ **Date Published:** 11/13/74

Family Pay Number: __________ Sex: M F (Circle 1)

PERFORMANCE CHECKLIST:

OVERALL PERFORMANCE: Satisfactory_____ Unsatisfactory_____

	CRITERION	
	Met	Not Met
Objective 1:		
1. Follows safe practices and procedures.		
Criterion: No injury results to the student or the equipment and complies with OSHA requirements.		
2. Follows proper procedures for disassembly.		
Criterion: No damage results to the appliance.		
3. Diagnosis and troubleshoots malfunctions properly.		
Criterion: When repaired, the appliance functions according to the manufacturer's specifications.		
4. Reassembles the appliance properly.		
Criterion: Appliance functions according to the manufacturer's specifications and procedures followed agree with those described in the service literature.		
5. The repaired appliance is repaired in a neat, professional manner.		

(Checklist continued)

	CRITERION	
	Met	Not Met
Criterion: No damage results to the appliance such as scrathces and dents		
6. All connections and fastenings are properly completed.		
Criterion: The appliance connection complies with the manufacturer's specifications. The connection is mechanically fastened and structurally sound. The connection is electrically fastened and free of defects.		
7. Appliance functions according to the manufacturer's specifications.		
Criterion: Manufacturer's specifications.		
8. Uses appropriate repair part and supplies.		
Criterion: They match exactly those listed in the manufacturer's specifications.		
Objective 2:		
9. Uses test equipment properly.		
Criterion: Manufacturer's specifications.		
10. Wattage readings are accurate.		
Criterion: Manufacturer's specifications.		
11. Voltage readings are accurate.		
Criterion: Manufacturer's specifications.		

(Checklist continued)

	CRITERION	
	Met	Not Met
12. Amperage readings are accurate.		
Criterion: Manufacturer's specifications.		
13. Resistance readings are accurate.		
Criterion: Manufacturer's specifications.		
14. When applicable mathematical calculations are correct.		
Criterion: AC/DC Circuit Manuals, Westinghouse		
15. The appliance is repaired in a reasonable time.		
Criterion: Not to exceed 4 hours.		
The student must successfully complete 13 out of 15 line items		
to achieve an overall score of satisfactory.		

File Code: 76.02.04.00.A2-1

Date Published: 9/11/75

Mountain-Plains Education &
Economic Development
Program, Inc.

Glasgow AFB, Montana 59231

Learning Experience Guide

UNIT: GARBAGE DISPOSERS

RATIONALE:

Every appliance service person is expected to service and repair various types of garbage disposers. An effective service person must understand how a particular appliance works. It takes a great deal of skill and understanding to be a proficient service person.

PREREQUISITES:

Unit: 76.02.03 Washing Machines
Unit: 77.02.01 Introduction to AC

OBJECTIVES:

Operate, disassemble, diagnose malfunctions, repair, service, replace component parts and reassemble a garbage disposer using service manuals and tools.

Identify garbage disposer characteristics of operation and component parts.

Identify procedures for diagnosis, repair and service of garbage disposer.

RESOURCES:

Printed Materials

Appliance Service Manuals for appliances used in the program.
Catalogs, appliance supply (assortment).
Home Appliance Servicing, Edwin P. Anderson, 2nd Edition, Theodore Audel and Company, Indianapolis, Indiana, 1965.
Order forms.
Work order forms.
Manufacturer's specification sheets.

Equipment

Disposer, garbage.

Principal Author(s): T. Ziller

Test Equipment: Amprobe (RS Rotary Meter B-A).
Meter, volt-ohm.

Tools: Box, utility.
Chisels, (½" and 5/8").
Cutters, diagonal.
Gun, Soldering (100-140 watt).
Hammer, ball pein (12 oz.).

Kit, solderless terminal.
Knife, electricians.
Level, aluminum 18".

Nut driver set.
Pliers, channel-lock (10").
Plier, long nose.
Plier, slip joint.
Plier, vise grip (size 7").
Puncher (3/16", 3/8" & 5/32").

Screwdriver, blade (set).
Screwdriver, Phillips (set).
Tape, steel measuring (12 ft.).
Wrench, adjustable.
Wrench, combination set.
Wrench, hex & spline (kit).

GENERAL INSTRUCTIONS:

This unit consist of four Learning Activity Packages (LAPs). Each LAP will provide specific information for completion of a learning activity.

The general procedure for this unit is as follows:

(1) Read the first assigned Learning Activity Package (LAP).
(2) Begin and complete the first assigned LAP.
(3) Take and score the LAP test.
(4) Turn in the LAP test answer sheet.
(5) Determine the reason for any missed items on the LAP test.
(6) Proceed to and complete the next assigned LAP in the unit.
(7) Complete all required LAPs for the unit by following steps 3 through 6.
(8) Take the unit tests as described in the Unit LEG "Evaluation Procedures."
(9) Proceed to the next assigned unit.

PERFORMANCE ACTIVITIES:

.01 Operation of an Electric Garbage Disposer
.02 Disassembly of an Electric Garbage Disposer
.03 Diagnosis of Malfunctions in an Electric Garbage Disposer
.04 Repair, Service and Reassembly of an Electric Garbage Disposer

EVALUATION PROCEDURE:

When pretesting:

1. The student takes the unit multiple-choice pretest.
2. Successful completion is 4 out of 5 items for each LAP part of the pretest.
3. The student then takes a unit performance test if the unit pretest was successfully completed.
4. Satisfactory completion of the performance test is meeting the criteria listed on the performance test.

When post testing:

1. The student takes a multiple-choice unit post test and a unit performance test.
2. Successful unit completion is meeting the listed criteria for the performance test.

FOLLOW-THROUGH:

After reading this unit guide, obtain the LAP for the first assigned performance activity.

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UNIT PRETEST: GARBAGE DISPOSALS

76.02.04.01.

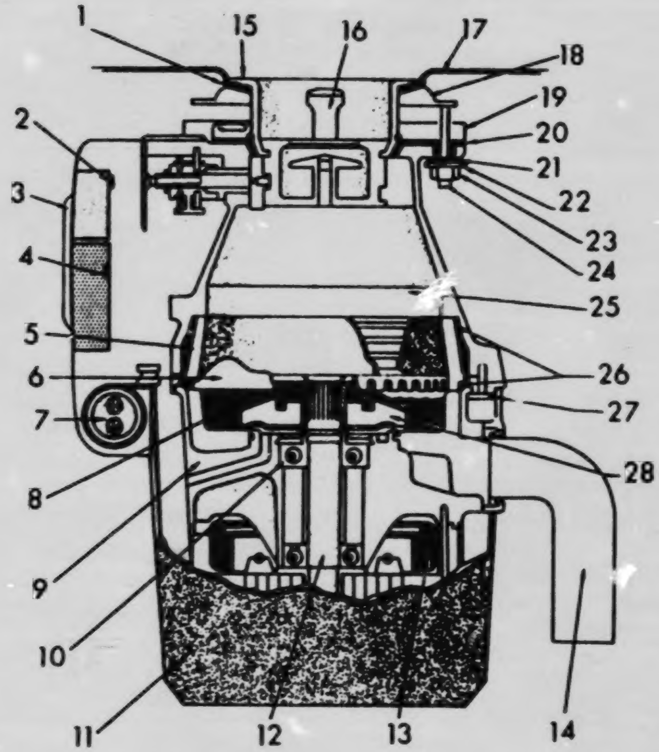
1. Most garbage disposers depend for their operation on a:
    - a. pumping action.
    - b. high voltage.
    - c. water-flow interlock.
    - d. vacuum.

2. What garbage disposer device makes it possible to run the drive motor in either direction?
    - a. power switch.
    - b. motor-reversing switch.
    - c. transmission
    - d. solenoid.

3. What approximately should the flow of cold water be for proper garbage disposer grinding?
    - a. 1½ gallons per min.
    - b. 5 gallons per min.
    - c. 20 gallons per min.
    - d. needs no water.

4. Garbage disposers generally operate on:
    - a. 115-volt, single-phase,A.C.
    - b. 220-volt,three phase A.C.
    - c. 32-volt D.C.
    - d. batteries.

5. What device protects the garbage disposer motor from overloading?
    - a. slip clutch.
    - b. 20 amp fuse.
    - c. circuit breaker.
    - d. thermal overload protector.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14

The cross-sectional view of a typical kitchen garbage disposer.

Fig. 9

76.02.04.02.

6. What number below identifies the shredding ring as in Fig. 9 of a garbage disposer?

   a. 28
   b. 26
   c. 6
   d. 5

7. What number below identifies the tailpiece as in Fig. 9 of a garbage disposer?

   a. 14
   b. 11
   c. 12
   d. 24

8. What number below identifies the starting control as in Fig. 9 of a garbage disposer?

   a. 2
   b. 3
   c. 4
   d. 7

9. In Fig. 9 of a garbage disposer, what numbers identifies the setscrew?

   a. 23
   b. 22
   c. 24
   d. 19

10. In Fig. 9 of a garbage disposer, what number identifies the bearings?

   a. 7
   b. 13
   c. 9
   d. 10

76.02.04.03.

11. On a garbage disposer, if the flow interlock is stuck, what happens?

   a. the motor is noisy.
   b. the motor will not start.
   c. the grinding process is slow.
   d. there is a short in the switch.

76.02.04.03. (continued)

12. In a garbage disposer, what could cause badly worn shredders?
    - a. leaking seals.
    - b. constant use with hot water.
    - c. loose bearings.
    - d. mixture of food wastes are inadequate.

13. If there is an abnormal noise or excessive vibration in a garbage disposal, check for:
    - a. flow interlock out of adjustment.
    - b. badly worn shredder.
    - c. badly worn impeller.
    - d. a piece of inorganic matter loose in the grinding chambers.

14. What is used to check for a loose flywheel on a garbage disposer?
    - a. torque wrench.
    - b. flywheel nut.
    - c. speed indicator.
    - d. voltmeter.

15. What may a faulty switch on a garbage disposer be checked with?
    - a. an ohmmeter.
    - b. a voltmeter.
    - c. an ammeter.
    - d. a watt meter.

76.02.04.04.

16. Impellers and shredders in a garbage disposer become worn with continued use. What is done when this happens?
    - a. they should be calibrated.
    - b. they should be sharpened.
    - c. they should be lubricated.
    - d. replacement is indicated.

17. Before proceeding with the electrical installation of a garbage disposer, check the:
    - a. Electrical Union Code.
    - b. National Electrical Code.
    - c. Service Manual.
    - d. local power company only.

76.02.04.04. (continued)

18. Which of the following procedures are used to reassemble the sound shell of a garbage disposer?

    a. back off lock huts then advance.
    b. snap screws together and tighten screws.
    c. tap machine bolts ¼ inch in size.
    d. snap tabs together and reinstall center clamp.

19. What device may a faulty switch on a garbage disposal be checked with?

    a. a voltmeter.
    b. a wattmeter.
    c. an ammeter.
    d. an ohmmeter.

20. What should be done to repair a garbage disposer if there is water in the motor?

    a. turn upside down to drain.
    b. drain motor upright.
    c. tighten and position seal retainer and retainer screws properly.
    d. loosen drain tap screw.

UNIT TEST ANSWER SHEET

Occupational Area: PRETEST
File Code: 76.02.04.00.A2-2
Name:

ANSWERS

LAP 01 1. C
2. B
3. A
4. A
5. D
LAP 02 6. D
7. A
8. C
9. C
10. D
LAP 03 11. B
12. D
13. D
14. B
15. A
LAP 04 16. D
17. B
18. D
19. D
20. C

21. ______
22. ______
23. ______
24. ______
25. ______
26. ______
27. ______
28. ______
29. ______
30. ______
31. ______
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55. ______
56. ______
57. ______
58. ______
59. ______
60. ______

File Code: 76.02.04.01.A2-0

Date Published: 9/11/75

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Learning Activity Package

Student: ____________________

Date: ____________________

PERFORMANCE ACTIVITY: Operation of an Electric Garbage Disposer

OBJECTIVES:

Describe the operation of an electric garbage disposer.

Draw a schematic diagram of the electrical circuits for garbage disposer.

EVALUATION PROCEDURE:

Student is to write a description about the operation of an electric garbage disposer using simple schematic diagrams that is consistent with the attached checklist.

Successfully complete at least 80% of the items on a multiple-choice test about this LAP.

RESOURCES:

Checklist: Operation of an Electric Garbage Disposer.
Garbage Disposer.
Home Appliance Servicing, Anderson.

PROCEDURES:

1. Read and study carefully the information found on pages 476-484 in Home Appliance Servicing. (Check the reference section of this package).
2. Operate the appliance and observe the characteristics of the appliance according to the items listed on the attached checklist: Operation of an Electric Garbage Disposer.
3. **Write a discription of an electric garbage disposer explaining the electrical system using simple schematics.**

Principal Author(s): T. Ziller

Procedures: Continued

4. Complete the multiple-choice test items for this LAP.

5. Check your answers with the test key. If your answers are all correct, record your time for completing this LAP on your SPR. If you have missed any questions, try to find out why you missed the test items. If you have any further problems, check with your instructor. When you have correctly completed all the test items, you may record your time on your SPR.

CHECKLIST: OPERATION OF A GARBAGE DISPOSER

____ 1. Turn all controls "off".

____ 2. Connect to electrical (115V 60HZ 15A) and water sources.

____ 3. Turn water "on".

____ 4. Turn control switch "on".

NOTE: Most disposers use capicator start motors.

____ 5. Turn control switch "off" and disconnect from utilities.

NOTE: Some disposers are sealed units and cannot be disassembled.

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LAP TEST: OPERATION OF AN ELECTRIC GARBAGE DISPOSER

1. What garbage disposer device acts to seal water from going down the shaft into motor housing?
   - a. armature bearing.
   - b. seal bushing.
   - c. weep hole.
   - d. water seal.

2. What garbage disposer device serves as a slinger to keep food waste from working its way down into seal lips causing possible leaks?
   - a. seal shield.
   - b. impeller.
   - c. lock nut.
   - d. sink stopper.

3. What garbage disposer device starts the motor?
   - a. transformer.
   - b. switch.
   - c. solenoid.
   - d. relay.

4. What is the name for the area in the garbage disposer in which the food wastes are loaded and pulverized?
   - a. hopper.
   - b. drain housing.
   - c. sink trap.
   - d. impeller housing.

5. What garbage disposer device performs the actual grinding of food wastes?
   - a. shredding ring.
   - b. flywheel impellers.
   - c. hopper.
   - d. motor housing.

6. Most garbage disposers depend for their operation on a:
   - a. pumping action.
   - b. high voltage.
   - c. water-flow interlock.
   - d. vacuum.

7. What approximately should the flow of cold water be for proper garbage disposer grinding?

   a. 1½ gallons per min.
   b. 5 gallons per min.
   c. 20 gallons per min.
   d. needs no water.

8. Why is cold water necessary during the garbage disposer operation?

   a. it prevents drain stoppage due to accumulated grease.
   b. cools the motor.
   c. cuts down noise.
   d. lubricates impeller.

9. The principle part of the garbage disposer is:

   a. relay switch.
   b. a high voltage motor.
   c. hopper.
   d. a high-torque electric motor.

10. What device protects the garbage disposer motor from overloading?

    a. slip clutch.
    b. 20 amp fuse.
    c. circuit breaker.
    d. thermal overload protector.

LAP TEST ANSWER KEY: OPERATION OF AN ELECTRIC GARBAGE DISPOSER

1. D
2. A
3. D
4. A
5. B
6. C
7. A
8. A
9. D
10. D

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Learning Activity Package

Student: ____________________

Date: ____________________

PERFORMANCE ACTIVITY: Disassembly of an Electric Garbage Disposer

OBJECTIVES:

Disassemble a garbage disposer using appropriate tools.

Identify each component part of a garbage disposer.

EVALUATION PROCEDURE:

Instructor will examine the disassembled appliance for correct disassembly and parts identification in accordance with the attached checklist.

Successfully complete at least 80% of the items on a multiple-choice test about this LAP.

RESOURCES:

Checklist: Disassembly of a Garbage Disposer.
Tools and a garbage disposer.
Service Manuals for the appliance.

PROCEDURE:

1. Follow the steps on the attached Checklist: Disassembly of a Garbage Disposer.
2. Complete the multiple choice test items for this LAP.
3. Check your answers with the test key. If your answers are all correct, record your time for completing this LAP on your SPR. If you have missed any questions, try to find out why you missed the test items. If you have any further problems, check with your instructor. When you have correctly completed all the test items, you may record your time on your SPR.

Principal Author(s):

T. Ziller

CHECKLIST: DISASSEMBLE OF A GARBAGE DISPOSER

_____ 1. Turn off electrical power to disposal.

_____ 2. Disconnect electrical and plumbing connections.

_____ 3. Support disposal unit and remove sink flange.

_____ 4. Remove disposal unit.

_____ 5. Remove bottom cover and main housing.

_____ 6. Disconnect wires (identify) and remove switch assembly.

_____ 7. Remove tailpiece, hopper and shredding ring.

_____ 8. Remove flywheel and rotor shaft.

_____ 9. Remove seals, bearings and stator.

_____ 10. Identify and label each part.

_____ 11. Have the instructor check your identifications.

Student: ______________________ File Code: 76.02.04.02.A2-2

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LAP TEST: DISASSEMBLY OF AN ELECTRIC GARBAGE DISPOSER

1. What number below identifies the capacitor of a garbage disposer (Fig. 9)?

   a. 4
   b. 13
   c. 7
   d. 2

2. What number below identifies the stator of a garbage disposer (Fig. 9)?

   a. 12
   b. 13
   c. 8
   d. 28

3. What number below identifies the sink flange in Fig. 9 of a garbage disposer?

   a. 16
   b. 15
   c. 18
   d. 1

4. What number below identifies the shredding ring as in Fig. 9 of a garbage disposer?

   a. 28
   b. 26
   c. 6
   d. 5

5. What number below identifies the tailpiece as in Fig. 9 of a garbage disposer?

   a. 14
   b. 11
   c. 12
   d. 24

6. What number below identifies the clamping ring as in Fig. 9 of a garbage disposer?

   a. 1
   b. 19
   c. 18
   d. 21

7. What number below identifies the starting control as in Fig. 9 of a garbage disposer?

   a. 2
   b. 3
   c. 4
   d. 7

8. In figure 9 of a garbage disposer, what number identifies fiber gasket?

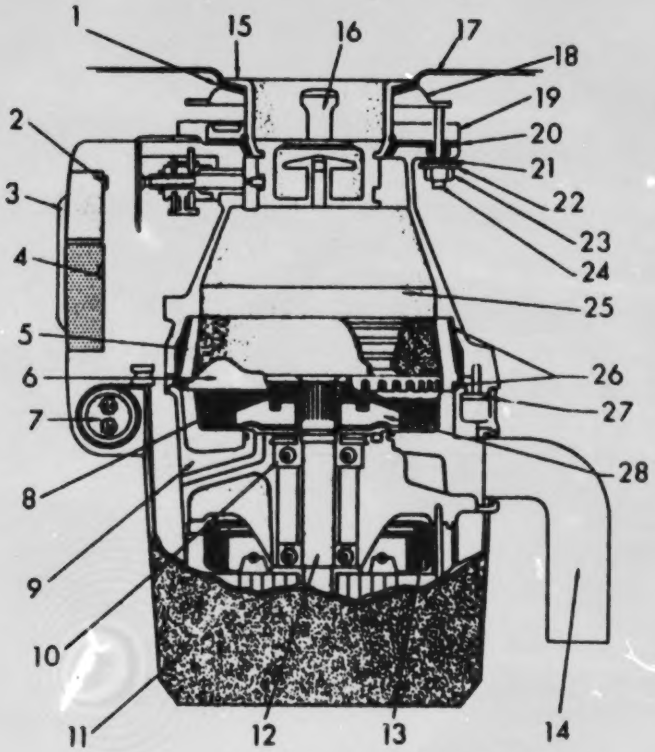
   a. 20
   b. 18
   c. 1
   d. 21

9. In Figure 9 of a garbage disposer, what number identifies the setscrew?

   a. 23
   b. 22
   c. 24
   d. 19

10. In Fig. 9 of a garbage disposer, what number identifies the support ring?

   a. 1
   b. 18
   c. 21
   d. 19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The cross-sectional view of a typical kitchen garbage disposer.

(From Home Appliance Servicing, Theodore Audel and Company, 1971.)

Fig. 9

LAP TEST ANSWER KEY: DISASSEMBLY OF AN ELECTRIC GARBAGE DISPOSER

1. C
2. B
3. B
4. D
5. A
6. C
7. C
8. C
9. C
10. D

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Learning Activity Package

Student: ____________________

Date: ____________________

PERFORMANCE ACTIVITY: Diagnosis of Malfunctions of an Electric Garbage Disposer

OBJECTIVES:

Diagnose malfunctions in a garbage disposer using appropriate tools and recommended procedures.

EVALUATION PROCEDURE:

Electrical values found during diagnosis are consistent with specifications found on the manufacturer's name plate.

Successfully complete at least 80% of the items on a multiple-choice test about this LAP.

RESOURCES:

Checklist: Diagnosis of Malfunctions - Garbage Disposer.
Tools, test equipment, work order form and garbage disposer.
Service Manuals for the appliance.

PROCEDURE:

1 Follow the steps on the attached Checklist: Diagnosing Malfunctions -Garbage Disposer.

2. Complete the multiple-choice test items for this LAP.

3. Check your answers with the test key. If your answers are all correct, record your time for completing this LAP on your SPR. If you have missed any questions, try to find out why you missed the test items. If you have any further problems, check with your instructor. When you have correctly completed all the test items, you may record your time on your SPR.

Principal Author(s): T. Ziller

CHECKLIST: DIAGNOSIS OF MALFUNCTIONS--GARBAGE DISPOSER

_____ 1. Complete and attach the work order form.

_____ 2. Make a thorough visual inspection of disposer.

_____ 3. Check line cords, pigtails, etc. (Ohmmeter). Resistance: _____

_____ 4. Check power switches and electrical controls (Ohmmeter). Resistance: _____

_____ 5. Check interlocks, equipment fuses and breakers (Ohmmeter). Resistance: _____

_____ 6. Check motor (Growler and Ohmmeter). Resistance: _____ Current: _____

_____ 7. Check for defective motor brushes and bearings.

_____ 8. Plug into 115V AC 60HZ source.

_____ 9. Check voltage source (Voltmeter). Voltage: _____

_____ 10. Check current (Amprobe). Current: _____

_____ 11. Calculate power dissipated in motor circuit. Wattage: _____

_____ 12. Compare your values with manufacturer's specifications.

NOTE: Refer to service manual for specific equipment data.

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LAP TEST: DIAGNOSIS OF MALFUNCTIONS IN AN ELECTRIC GARBAGE DISPOSER

1. If the garbage disposer motor won't start, check for:

   a. badly worn impellers.
   b. a jammed flywheel.
   c. loose mounting screws.
   d. an inoperative bearing.

2. If the garbage disposer motor will not stop, the probable cause could be:

   a. an inoperative capacitor.
   b. a stuck impeller.
   c. an inoperative bearing.
   d. a short around the starting switch.

3. If there is a water leak in a garbage disposer, check for:

   a. loose mounting screws at the sinks.
   b. door drainage.
   c. grease trap stoppage.
   d. a stuck interlock.

4. On a garbage disposer, if the flow interlock is stuck, what happens?

   a. the motor is noisy.
   b. the motor will not start.
   c. the grinding process is slow.
   d. there is a short in the switch.

5. In the operation of a garbage disposer, if a putty seal is broken, what happens?

   a. the grinding process is slow.
   b. there is a water leak.
   c. there is improper venting of the drain line.
   d. there is excessive vibration.

6. If the garbage disposer is acting erratically-won't start-first check:

   a. reset overload protector button.
   b. for a water leak.
   c. for an inoperative bearing.
   d. for a loose connection.

7. If there is an abnormal noise or excessive vibration in a garbage disposal, check for:

   a. flow interlock out of adjustment.
   b. badly worn shredder.
   c. badly worn impeller.
   d. a piece of inorganic matter loose in the grinding chamber.

8. What is used to check for a loose flywheel on a garbage disposer?

   a. torque wrench.
   b. flywheel nut.
   c. speed indicator.
   d. voltmeter.

9. If there is a water leak through the hopper wall of a garbage disposer, look for a:

   a. crack in the metal hopper wall.
   b. loose seal.
   c. broken shredder.
   d. plugged drain.

10. If the garbage disposer leaks at the shredder housing joint, check:

   a. locking nut.
   b. hopper gasket for tears, splits, etc.
   c. split housing.
   d. worn shredder.

LAP TEST ANSWER KEY: DIAGNOSIS OF MALFUNCTIONS IN AN ELECTRIC GARBAGE DISPOSER

1. B
2. D
3. A
4. B
5. B
6. A
7. D
8. B
9. A
10. B

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Learning Activity Package

Student: ____________________

Date: ____________________

PERFORMANCE ACTIVITY: Repair, Service and REassembly of an Electric Garbage Disposer

OBJECTIVES:

Repair, service and reassemble a garbage disposer.

Order replacement parts for the garbage disposer.

EVALUATION PROCEDURE:

The appliance must operate properly.

Successfully complete at least 80% of the items on a multiple-choice test about this LAP.

RESOURCES:

Checklist: Repair, Service and Reassembly - Garbage Disposers.
Test equipment tools, and requisition form.
Garbage disposer.
Service manuals for the appliance.

PROCEDURE:

1. Follow the steps on the attached Checklist: Repair, Service and Reassembly - Garbage Disposer.

2. Complete the multiple-choice test items for this LAP.

3. Check your answers with the test key. If your answers are all correct, record your time for completing this LAP on your SPR. If you have missed any questions, try to find out why you missed the test items. If you have any further problems, check with your instructor. When you have correctly completed all the test items, you may record your time on your SPR.

Principal Author(s): T. Ziller

CHECKLIST: REPAIR, SERVICE AND REASSEMBLY--GARBAGE DISPOSER

Repair & Service:

_____ 1. If the disposer is jammed, free by manually reversing the motor using a hex wrench or key.

_____ 2. If an interlock switch is inoperative, replace or modify using a manual switch.

_____ 3. If the shredder ring is nicked or is dule, replace with same part [illegible] number (see parts list).

_____ 4. If the motor has a short, open or is grounded; repair or replace.

_____ 5. If the motor capacitor is shorted or opened, replace using same value and working voltage.

_____ 6. If any electrical wire is frayed, nicked or broken; replace with same wire guage and color code.

Reassemble:

_____ 1. Mount shredder ring on motor armature.

_____ 2. Replace shredder housing and mount to motor housing.

_____ 3. Attach all electric wires (use wire diagram).

_____ 4. Replace access panels.

NOTE: Some garbage disposers are sealed units and have to be returned to the manufacturer.

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LAP TEST: REPAIR, SERVICE AND REASSEMBLY OF AN ELECTRIC GARBAGE DISPOSER

1. If a flywheel jam occurs between the edge of the flywheel and the shredding ring of a garbage disposer, what should be done to repair it?

   a. remove and reposition the shredding ring to clear this problem.
   b. tighten the flywheel.
   c. tighten the shredding ring.
   d. remove the impellers.

2. Replace a seal in a garbage disposer when what condition exists?

   a. a worn shredder.
   b. a jammed flywheel.
   c. a water leak.
   d. an inoperative bearing.

3. Why should the serviceman check with municipal authorities before installing garbage disposers in a given community?

   a. so the disposer will be on the garbage pickup route.
   b. to find sewer lines.
   c. certain localities do not permit garbage disposer installation.
   d. to avoid sewer gas.

4. Prior to the actual installation of a garbage disposer, what procedure should be followed?

   a. bypass sewer system.
   b. hookup to power source.
   c. check for defective unit.
   d. survey the home drainage system.

5. Which of the following is required at the site of the installation of a garbage disposer?

   a. provide cable connections between the disposer junction box and the main switch panel.
   b. ground the sewer pipe inlet.
   c. tag the unit after inspection.
   d. inform local residents of possible sewer problems.

6. Before proceeding with the electrical installation of a garbage disposer, check the:

   a. Electrical Union Code.
   b. National Electrical Code.
   c. Service Manual.
   d. local power company only.

7. What relay switch functions to open the heat element circuit when the proper drying temperature is reached on one or more automatic drying cycles?

   a. modulating relay switch.
   b. 3-cycle relay switch.
   c. heat element relay switch.
   d. double pole relay.

8. What electric dryer device functions to provide a circuit to the timer motor during the cool down period?

   a. thermopile.
   b. sensor thermostat.
   c. fixed thermostat.
   d. thermocouple.

9. What electric dryer device acts as a ballast to cut down the voltage for the ozone lamp?

   a. ozone ballast.
   b. drum light.
   c. resistor.
   d. variactor.

10. The speed reduction between the electric dryer motor and drum is accomplished by means of a(n):

    a. transmission gears.
    b. pulley arrangement.
    c. direct drive.
    d. automatic slip-clutch.

LAP TEST: **REPAIR, SERVICE AND REASSEMBLY OF AN ELECTRIC GARBAGE DISPOSER**

1. A
2. C
3. C
4. D
5. A
6. B
7. D
8. B
9. D
10. A

Student: ______________________ **File Code:** 76.02.04.00.B2-2

Date: ______________________ **Date Published:** 11-20-74

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UNIT POST TEST: GARBAGE DISPOSALS

76.02.04.01.

1. What garbage disposer device acts as a drain housing that diverts water and pulverized food wastes down the drain?

   a. hopper gasket.
   b. shredder housing.
   c. motor housing.
   d. sink trap.

2. What provides extra protection to the garbage disposer motor in case water should get past the "O" ring?

   a. seal shield.
   b. seal bushing.
   c. water slinger.
   d. weep hole.

3. What device is designed to provide the necessary inertia to moderate and compensate for any speed fluctuation in the garbage disposer?

   a. cooling fan.
   b. stator house.
   c. flywheel.
   d. solenoid.

4. What garbage disposer device makes it possible to run the drive motor in either direction?

   a. power switch.
   b. motor-reversing switch.
   c. transmission.
   d. solenoid.

5. Garbage disposers generally operate on:

   a. 115-volt, single-phase, A.C.
   b. 220 volts, three phase, A.C.
   c. 32 volts, D.C.
   d. batteries.

76.02.04.02.

6. In Fig. 9 of a garbage disposer, identify the flywheel by the correct number.

   a. 28
   b. 6
   c. 8
   d. 25

7. In Fig. 9 of a garbage disposer, identify the impeller by the correct number.

   a. 12
   b. 6
   c. 13
   d. 28

8. In Fig. 9 of a garbage disposer, identify the hopper by the correct number.

   a. 16
   b. 25
   c. 5
   d. 12

9. In Fig. 9 of a garbage disposer identify the shaft seal by number.

   a. 21
   b. 8
   c. 6
   d. 28

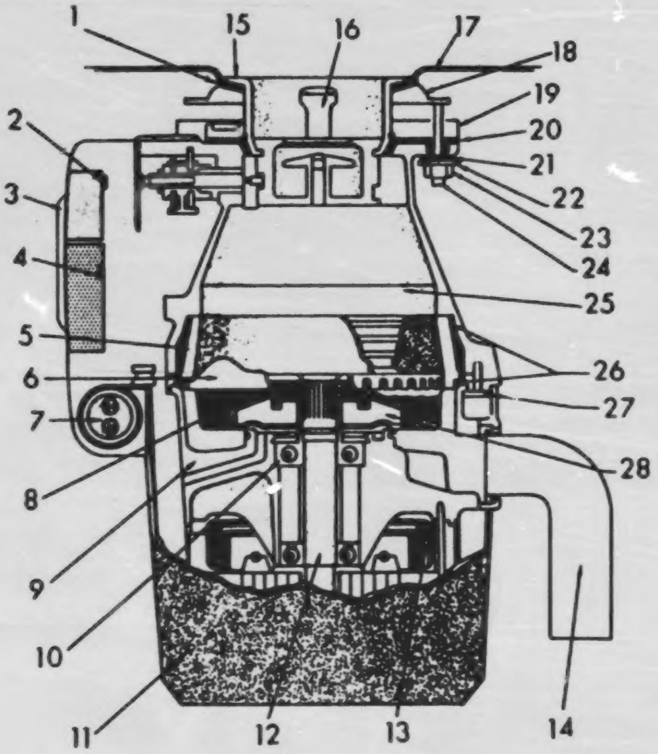
10. In Fig. 9 of a garbage disposer, what number identifies the bearings?

   a. 7
   b. 13
   c. 9
   d. 10

76.02.04.03.

11. If the garbage disposer is grinding slowly, check for:

   a. plunger out of adjustment.
   b. loose mounting screws.
   c. grease trap stoppage.
   d. badly worn shredder.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The cross-sectional view of a typical kitchen garbage disposer.

Fig. 9

76.02.04.03. (continued)

12. Insufficient water used with a garbage disposal could cause:

    a. an inoperative bearing.
    b. noisy operation.
    c. excessive vibration.
    d. drain stoppage.

13. In a garbage disposer, what could cause badly worn shredders?

    a. leaking seals.
    b. constant use with hot water.
    c. loose bearings.
    d. mixture of food wastes are inadequate.

14. If the garbage disposer will not shut off, check the:

    a. switch plunger for binding action against the seal gasket on the hopper.
    b. over flow switch.
    c. short in the motors armature.
    d. continuity in the motor's field coil.

15. What may a faulty switch on a garbage disposer be checked with?

    a. an ohmmeter.
    b. a voltmeter.
    c. an ammeter.
    d. a watt meter.

76.02.04.04.

16. If a flywheel jam occurs in a garbage disposer, repair by:

    a. removing the flywheel.
    b. loosening a nut.
    c. removing foreign object with a pair of tongs.
    d. taking the disposer apart.

17. Impellers and shredders in a garbage disposer become worn with continued use. What is done when this happens?

    a. they should be calibrated.
    b. they should be sharpened.
    c. they should be lubricated.
    d. replacement is indicated.

76.02.04.04. (continued)

18. What aid will assist the servicemen in determining trouble, cause and remedy procedures of a garbage disposer?

    a. garbage disposer service chart.
    b. ask for customers' diagnosis.
    c. National Electrical Code index.
    d. an assistant service man.

19. If there is drain stoppage because of insufficient water used while running a garbage disposer, how is it to be repaired?

    a. clean and adjust the flow interlock.
    b. clean only.
    c. provide proper vent.
    d. add Rid-x.

20. If the ground prong is broken off the garbage disposer plug, what repair is necessary for a proper ground?

    a. solder on a new one.
    b. replace the plug.
    c. reposition plug to account for missing part.
    d. replace power cord.

UNIT TEST ANSWER SHEET

POST TEST

Occupational Area:
File Code: 76.02.04.00.B2-2
Name:

ANSWERS

LAP 01	1.	B	21.		41.	
	2.	C	22.		42.	
	3.	C	23.		43.	
	4.	B	24.		44.	
	5.	A	25.		45.	
LAP 02	6.	C	26.		46.	
	7.	B	27.		47.	
	8.	B	28.		48.	
	9.	D	29.		49.	
	10.	D	30.		50.	
LAP 03	11.	D	31.		51.	
	12.	D	32.		52.	
	13.	D	33.		53.	
	14.	A	34.		54.	
	15.	A	35.		55.	
LAP 04	16.	C	36.		56.	
	17.	D	37.		57.	
	18.	A	38.		58.	
	19.	A	39.		59.	
	20.	B	40.		60.	

Student: ______________________ **File Code:** 76.02.04.00.A1-5

Date: ______________________ **Date Published:** 11/14/74

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Family Pay Number: ____________ Sex: M F (Circle 1)

UNIT PERFORMANCE TEST: GARBAGE DISPOSERS

OBJECTIVE 1:

Given a malfunctioning garbage disposer, the student will service and repair the disposer so that it functions according to the manufacturer's specifications, following safe practices and procedures.

OBJECTIVE 2:

Using appropriate tools and test equipment, the student will calculate and record amperage, voltage, resistance, and wattage of a garbage disposer.

TASK:

The student will service and repair a malfunctioning garbage disposer and, in the process, he will take and record amperage, voltage, resistance, and wattage readings, using appropriate test equipment.

ASSIGNMENT:

CONDITIONS:

The student will be given a malfunctioning garbage disposer (it may be bugged by the instructor or it may be one brought in by a customer). He will be required to service and repair the garbage disposer in conditions similar to those in a typical appliance repair shop. He will be allowed to use any and all tools, equipment, service manuals, text books, etc., commonly found in a repair shop. He must complete it in a reasonable length of time with no assistance from the instructor(s) or students.

RESOURCES:

Tools:

Amprobe RS-3 Rotary Meter (B-A)
Soldering gun 100 to 140 watt
Adjustable Wrench
Nut Driver Set
Long Nose Pliers
Diagonal Cutters
Slip Joint Pliers
Screwdriver Set
Phillips Set
Hex & Spline Wrench Kit
Vise Grip Plier Model Size 7"
Utica Electrician's Knife, Standard Size
18" Aluminum Level
12' Steel Tape
Punch & Chisel Set, 1/2", 5/8" chisels; 3/16, 3/8, 5/32 punches
Combination Wrench Set
Hammer (Ball Peen) 12 oz.
10" Channel-lock Plier
Utility Box
VOM
Assortment of wire, fasteners and repair parts
Garbage Disposer

Printed Material:

Various Repair Manuals
Manufacturer's Specification Sheets

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Student: ____________________ **File Code:** 76.02.04.00.A1-5

Date: ____________________ **Date Published:** 11/14/74

Family Pay Number: __________ Sex: M F (Circle 1)

PERFORMANCE CHECKLIST:

OVERALL PERFORMANCE: Satisfactory_____ Unsatisfactory_____

	CRITERION Met	CRITERION Not Met
Objective 1:		
1. Follows safe practices and procedures.		
Criterion: No injury results to the student or the		
equipment and complies with OSHA requirements.		
2. Follows proper procedures for disassembly.		
Criterion: No damage results to the appliance.		
3. Diagnosis and troubleshoots malfunctions properly.		
Criterion: When repaired, the appliance functions according		
to the manufacturer's specifications.		
4. Reassembles the appliance properly.		
Criterion: Appliance functions according to the manufacturer's		
specifications and the procedures followed agree with		
those described in the service literature.		
5. The repaired appliance is repaired in a neat,		
professional manner.		

(Checklist continued)

	CRITERION	
	Met	Not Met
Criterion: No damage results to the appliance such as scratches and dents.		
6. All connections and fastenings are properly completed.		
Criterion: The appliance connection complies with the manufacturer's specifications. The connection is mechanically fastened and structurally sound. The connection is electrically fastened and free of defects.		
7. Appliance functions according to the manufacturer's specifications.		
Criterion: Manufacturer's specifications.		
8. Uses appropriate repair part and supplies.		
Criterion: They match exactly those listed in the manufacturer's specifications.		
Objective 2:		
9. Uses test equipment properly.		
Criterion: Manufacturer's specifications.		
10. Wattage readings are accurate.		
Criterion: Manufacturer's specifications.		
11. Voltage readings are accurate.		
Criterion: Manufacturer's specifications.		

(Checklist continued)

	CRITERION	
	Met	Not Met
12. Amperage readings are accurate.		
Criterion: Manufacturer's specifications.		
13. Resistance readings are accurate.		
Criterion: Manufacturer's specifications.		
14. When applicable mathematical calculations are correct.		
Criterion: AC/DC Circuit Manuals, Westinghouse.		
15. The appliance is repaired in a reasonable time.		
Criterion: Not to exceed 2 hours.		
The student must successfully complete 13 out of 15 line items		
to achieve an overall score of satisfactory.		

File Code: 76.02.05.00.A2-1

Date Published: 9/11/75

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Learning Experience Guide

UNIT: CLOTHES DRYERS

RATIONALE:

Every appliance service person is expected to service and repair various types of clothes dryers. An effective service person must understand how a particular appliance works. It takes a great deal of skill and understanding to be a proficient service person.

PREREQUISITES:

Unit: 76.02.03 Garbage Disposers
Unit: 77.02.02. AC Relationships

OBJECTIVES:

Operate, disassemble, diagnose malfunctions, repair, service and replace component parts, and reassemble a clothes dryer using service manuals and tools.

Identify clothes dryer characteristics of operation, and component parts.

Identify procedures for diagnosis, repair, and service clothes dryers.

RESOURCES

Printed Materials

Appliance Service Manuals for appliances used in the program.
Catalogs, appliance supply (assortment).
Home Appliance Servicing, Edwin P. Anderson, 2nd Edition, Theodore Audel and Company, Indianapolis, Indiana , 1965.
Order forms.
Work order forms.
Manufacturer's specification sheets.

Equipment

Dryer, clothes (electric, automatic).
Dryer, clothes (gas, automatic).

Principal Author(s): T. Ziller

Test Equipment: Amprobe (RS-3 Rotary Meter B-A).
Meter, volt-ohm.

Tools; Box, utility.
Chisels, (½" and 5/8").
Cutters, diagonal.
Gun, Soldering (100-140 watt).
Hammer, ball pein (12 oz.).

Kit, solderless terminal.
Knife, electricians.
Level, aluminum 18"
Nut driver set.
Pliers, channel-lock (10").
Plier, long nose.
Plier, slip joint.
Plier, vise grip.
Puncher, (3/16", 3/8" & 5/32").

Screwdriver, Phillips (set).
Tape, steel measuring (12 ft.).
Wrench, adjustable.
Wrench, combination set.
Wrench, hex & spline (kit).

GENERAL INSTRUCTIONS:

This unit consists of seven Learning Activity Packages (LAPs). Each LAP will provide specific information for completion of a learning activity.

The general procedure for this unit is as follows:

(1) Read the first assigned Learning Activity Package (LAP).
(2) Begin and complete the first assigned LAP.
(3) Take and score the LAP test.
(4) Turn in the LAP test answer sheet.
(5) Determine the reason for any missed items on the LAP test.
(6) Proceed to and complete the next assigned LAP in the unit.
(7) Complete all required LAPs for the unit by following steps 3 through 6.
(8) Take the unit tests as described in the Unit LEG "Evaluation Procedures."
(9) Proceed to the next assigned unit.

PERFORMANCE ACTIVITIES:

.01 Operation of an Electric Clothes Dryer
.02 Disassembly of an Electric Clothes Dryer
.03 Diagnosis of Malfunctions in an Electric Clothes Dryer
.04 Repair, Service and Reassembly of an Electric Clothes Dryer
.05 Operation of a Gas Clothes Dryer
.06 Disassembly of a Gas Clothes Dryer
.07 Diagnosis of Malfunctions in a Gas Clothes Dryer
.08 Repair, Service and Reassembly of a Gas Clothes Dryer

EVALUATION PROCEDURE:

When pretesting:

1. The student takes the unit multiple-choice pretest.
2. Successful completion is 4 out of 5 items for each LAP part of the pretest.
3. The student then takes a unit performance test if the unit pretest was successfully completed.
4. Satisfactory completion of the performance test is meeting the criteria listed on the performance test.

When post testing:

1. The student takes a multiple-choice unit post test and a unit performance test.
2. Successful unit completion is meeting the listed criteria for the performance test.

FOLLOW-THROUGH

After reading this unit guide, obtain the LAP for the first assigned performance activity.

Student: ____________________ File Code: 76.02.05.00.A2-2

Date: ____________________ Date Published: 11-18-74

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UNIT PRETEST: CLOTHES DRYERS

76.02.05.01.

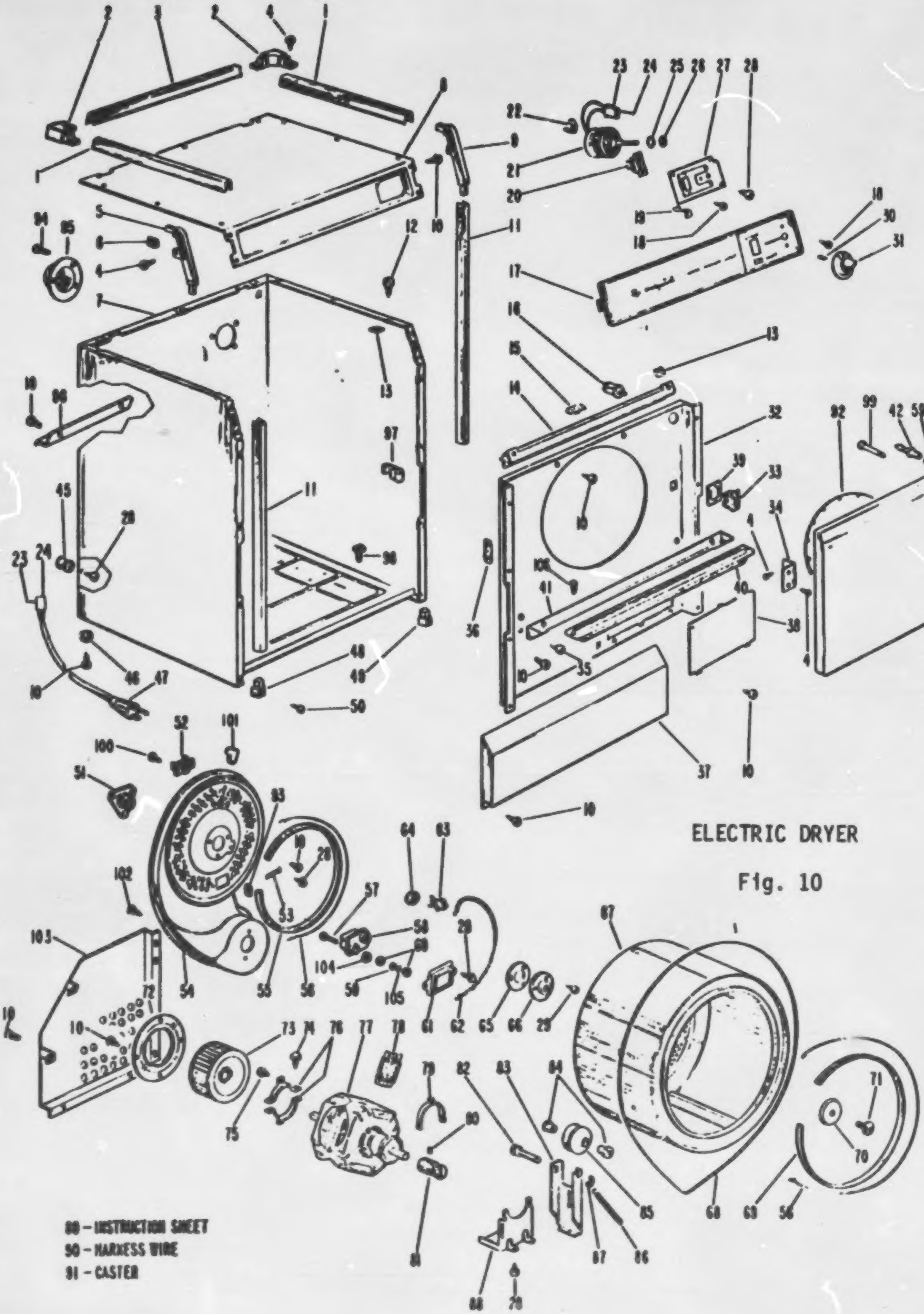
1. electric dryers require a:
   - a. 2-wire polyphase 115 VAC 60 Hz.
   - b. 3-wire, single phase, 120/240 volt 60 Hz.
   - c. 2-wire, two phase 115 VAC 60 Hz.
   - d. 3-wire, polyphase 120/240 VAC 60 Hz.

2. What device delays closing the heat element circuit until the electric dryer motor is running at full speed?
   - a. bimetallic relay.
   - b. centrifugal start switch.
   - c. centrifugal thermostat switch.
   - d. centrifugal motor switch.

3. On a 3-cycle electric dryer, the relay switch is a:
   - a. double-pole, single-throw relay switch.
   - b. single-pole, single-throw relay switch.
   - c. single pole switch.
   - d. double pole switch.

4. What device converts heat into mechanical motion which in turn opens or closes the circuits supplying a current to the heat element on the electric dryer?
   - a. thermopile.
   - b. fixed thermostat.
   - c. adjustable thermostat.
   - d. thermocouple.

5. What electric dryer device functions to provide a circuit to the timer motor during the cool down period?
   - a. thermopile.
   - b. sensor thermostat.
   - c. fixed thermostat.
   - d. thermocouple.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ELECTRIC DRYER

Fig. 10

89 - INSTRUCTION SHEET
90 - HARNESS WIRE
91 - CASTER

76.02.05.02.

6. What number below identifies the blower housing as shown in Fig. 10 (electric dryer)?

   a. 73
   b. 55
   c. 54
   d. 72

7. In Fig. 10 of an electric dryer, what number below identifies the drum assembly?

   a. 92
   b. 68
   c. 54
   d. 67

8. In Fig 10 of an electric dryer, what number below identifies the motor assembly?

   a. 73
   b. 77
   c. 72
   d. 67

9. In Fig 10 of an electric dryer, what number below identifies the drive pulley?

   a. 73
   b. 85
   c. 81
   d. 78

10. In Fig 10 of an electric dyrer, what number below identifies the door gasket?

   a. 92
   b. 65
   c. 55
   d. 59

76.02.05.03.

11. If an electric dryer motor timer is operative but timer does not advance, a possible cause may be:

   a. thermal relay is shorted.
   b. door switch shorted.
   c. thermostat is bypassed.
   d. operating thermostat inoperative.

76.02.05.03. (continued)

12. If an electric dryer drying temperature is too high, a possible cause may be:

    a. thermopile is opened.
    b. open door switch.
    c. defective inlet sensor thermostat.
    d. heat element relay.

13. If a blown fuse is found to have caused an electric dryer to not start, the dryer should be thoroughly examined for:

    a. a bypassed circuit.
    b. an open circuit.
    c. internal short-circuits.
    d. an internal power loss.

14. Before attempting to check the interior of an electric dryer:

    a. power should be disconnected.
    b. the door should be sealed open.
    c. the door switch should be disconnected.
    d. the timer should be disconnected.

15. A loose connection on an electric dryer terminal block, motor, switch, or timer may be the cause of :

    a. a shorted circuit.
    b. an open circuit.
    c. a closed circuit.
    d. a grounded circuit.

76.02.05.04.

16. An intermittent or persistent squeak on an electric dryer is caused by what is known as a "dry belt" and can usually be corrected by:

    a. silicone lubrication on the bearing drive.
    b. graphite lubrication on the bearing drive.
    c. thin coat of surface belt dressing on the pulleys.
    d. moistening with water.

17. A noisy suction fan on an electric dryer is usually corrected by:

    a. removing the pulley tension.
    b. aligning the pulleys; replacing defective belts.
    c. relieving the belt, thereby the tension.
    d. insulating the fan cage.

76.02.05.04. (continued)

18. Test the electric dryer door circuit with a test lamp. If lamp lights, but does not light when plunger is depressed:

   a. replace switch.
   b. adjust door switch.
   c. lubricate door assembly.
   d. remove test lamp.

19. If clothes are overdry or are wrinkled at end of electric drying, correct by:

   a. replacing timer contacts.
   b. replacing heating elements.
   c. replacing thermostat.
   d. checking moisture cycle for misalignment.

20. If electric dryer germicidal bulb does not light, check:

   a. calibrate door switch.
   b. defective door switch; replace.
   c. bypass germicidal bulb.
   d. remove drum switch.

76.02.05.05.

21. What device controls the flow of gas to the pilot and the main burner assemblies?

   a. solenoid valve.
   b. baso valve.
   c. pressure regulator.
   d. thermostat.

22. What gas dryer device shuts off the gas if there should be a mechanical failure of the main burner solenoid?

   a. unlatch solenoid.
   b. catch solenoid.
   c. emergency solenoid.
   d. bypass solenoid.

23. What size should the gas supply line be for a gas dryer?

   a. 3/4 inch.
   b. 3/8 inch.
   c. 1 inch.
   d. ½ inch.

76.02.05.05. (continued)

24. If the diaphragm in the regulator should rupture, what gas dryer device functions to restirct escaping gas to maximum of one cubic foot per hour?

    a. leak limiter.
    b. after-burner.
    c. leak regulator.
    d. bypass regulator.

25. What device is necessary in a gas supply line in order to shutoff the dryer gas supply without interrupting gas to other appliances?

    a. solenoid valve.
    b. shutoff valve.
    c. baso valve.
    d. main dryer valve.

76.02.05.06.

26. What number below identifies the main burner orifice as shown in Fig. 11 (gas dryer)?

    a. 30
    b. 13
    c. 11
    d. 14

GAS VALVE & BURNER ASSEMBLY #1

(STANDING PILOT - NA & NB MODELS)

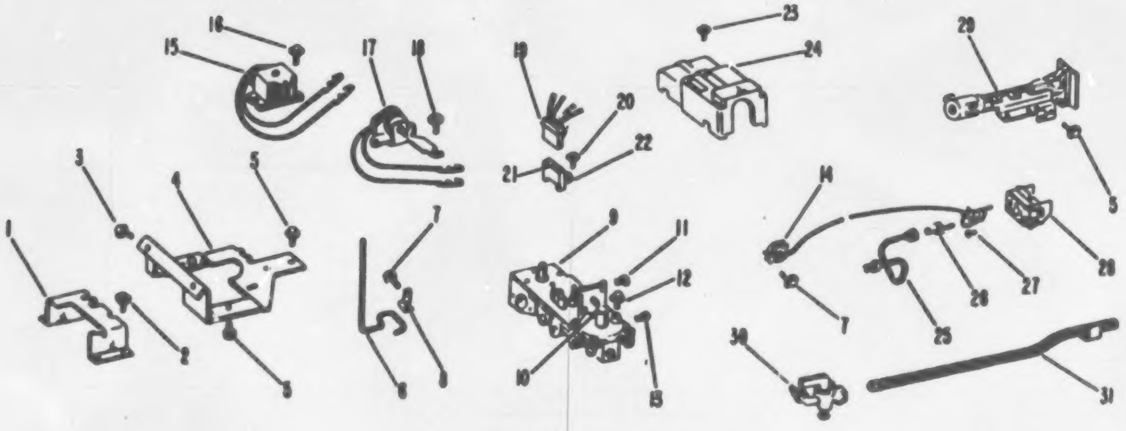

Fig. 11

76.02.05.06. (continued)

27. What number below identifies the main gas valve as shown in Fig. 11 (gas dryer)?

    a. 10
    b. 30
    c. 31
    d. 29

28. What number below identifies the pilot shield as shown in Fig. 11 (gas dryer)?

    a. 28
    b. 29
    c. 24
    d. 10

29. In Fig. 11 of a gas dryer, what number below identifies the unlatch coil?

    a. 15
    b. 17
    c. 31
    d. 25

30. In Fig. 11 of a gas dryer, what number below identifies the terminal housing?

    a. 21
    b. 17
    c. 19
    d. 15

76.02.05.07.

31. If a gas dryer motor will not start, check for:

    a. impeller loose on motor shaft.
    b. tripped overload relay.
    c. drum rubbing against drum case.
    d. dryer not properly level.

32. If a gas dryer is noisy during operation, check for:

    a. tub locked, belt slips.
    b. locked impeller.
    c. broken idler-pulley spring.
    d. pulley loose on shaft.

76.02.05.07. (continued)

33. If a gas dryer drying chamber does not turn with motor running, check for:

    a. drum rubbing against drum case.
    b. locked impeller.
    c. worn or broken belt.
    d. defective high-limit switch.

34. If a gas dryer has a sharp blue flame, check for:

    a. improper flow of secondary air.
    b. improper flow of primary air.
    c. main burner orifice too small.
    d. wrong size of pilot orifice.

35. If a gas dryer motor is overheating, check for:

    a. defective high-limit thermostat.
    b. defective thermocouple.
    c. thermostat setting too high.
    d. too much current in armature.

76.02.05.08.

36. Test a gas dryer main burner solenoid by applying 115 volts to terminal of solenoid. If audible click is not heard:

    a. solenoid is defective; replace.
    b. solenoid is normal.
    c. solenoid is connected backward.
    d. solenoid needs 230V.

37. Measuring resistance in gas dryer components such as thermostats and solenoid valves will uncover:

    a. improper voltages.
    b. reversed polarity.
    c. shorts or opens.
    d. misaligned thermostats or solenoids.

38. To discover shorts in the wire harness, a check may be made by:

    a.. using an amprobe.
    b. ohmmeter.
    c. voltmeter.
    d. ammeter.

76.02.05.08. (continued)

39. When a wattmeter is used to determine how effeciently the mechanical system of the gas dryer is functioning, and there is too high a reading, this can indicate:

    a. direct short.
    b. mechanical binding.
    c. direct open.
    d. low voltage.

40. To check operation of the gas dryer safety valve, connect millivolt meter to pilot safety valve; if the drop-out point is less than 2 millivolts, this indicates:

    a. high voltage.
    b. normal operation.
    c. defective valve; replace.
    d. low voltage.

UNIT TEST ANSWER SHEET

PRETEST

Occupational Area: ____________________
File Code: 76.02.05.00.A2-2
Name: ____________________

ANSWERS

LAP 01	1.	B	LAP 05	21.	B	41.	
	2.	D		22.	A	42.	
	3.	A		23.	D	43.	
	4.	C		24.	A	44.	
	5.	B		25.	B	45.	
LAP 02	6.	C	LAP 06	26.	C	46.	
	7.	D		27.	B	47.	
	8.	B		28.	A	48.	
	9.	C		29.	B	49.	
	10.	A		30.	C	50.	
LAP 03	11.	D	LAP 07	31.	B	51.	
	12.	D		32.	D	52.	
	13.	C		33.	C	53.	
	14.	A		34.	B	54.	
	15.	B		35.	A	55.	
LAP 04	16.	C	LAP 08	36.	A	56.	
	17.	B		37.	C	57.	
	18.	A		38.	A	58.	
	19.	C		39.	B	59.	
	20.	B		40.	C	60.	

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Learning Activity Package

Student: ____________________

Date: ____________________

PERFORMANCE ACTIVITY: Operation of an Electric Clothes Dryer

OBJECTIVES:

Describe the operation of an electric clothes dryer.

Draw a schematic diagram of the diagram of the electrical circuits for the clothes dryer.

EVALUATION PROCEDURE

Student is to write a description about the operation of an electric clothes dryer using simple electrical schematics that are consistent with the attached checklist.

Successfully complete at least 80% of the items on a multiple-choice test about this LAP.

RESOURCES:

Checklist: Operation of an Electric Clothes Dryer.
Electric Clothes Dryer.
Home Appliance Servicing, Anderson

PROCEDURE:

1. Read and study carefully the information found on pages 405-433 in Home Appliance Servicing.
2. Operate the appliance and observe the characterisitcs of the appliance following the steps listed on the attached Checklist: Operation of an Electric Clothes Dryer.
3. Write a description of an electric clothes dryer explaining the electrical systems using simple schematics.
4. Complete the multiple-choice test items for this LAP.
5. Check your answers with the test key. If your answers are all correct, record your time for completing this LAP on your SPR. If you have missed any questions, try to find out why you missed the test items. If you have any further problems, check with your instructor. When you have correctly completed all the test items, you may record your time on your SPR.

Principal Author(s): T. Ziller

CHECKLIST: OPERATION OF AN ELECTRIC CLOTHES DRYER

____ 1. Turn timer switch to "off" position.

____ 2. Connect to a 230V 60HZ single phase 30A circuit.

____ 3. Vent heat duct.

____ 4. Turn timer to one heat setting and start dryer.

NOTE: The electric motor is a split-phase type. It is part of the heating element circuit.

____ 5. Select all heat settings and observe the drums rotation.

____ 6. Turn timer control "off".

____ 7. Check all lighting circuits.

____ 8. Turn all circuits "off" and disconnect power source.

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LAP TEST: OPERATION OF AN ELECTRIC CLOTHES DRYER

1. On an electric dryer the on/off heater cycling is normally controlled by:

   a. the door switch.
   b. the drum outlet thermostat.
   c. the timer switch.
   d. the selector switch.

2. Electric dryers require a:

   a. 2-wire polyphase 115 VAC 60 Hz.
   b. 3-wire, single phase, 120/240 volt 60 Hz.
   c. 2-wire two phase 115 VAC 60 Hz.
   d. 3 wire polyphase 120/240 VAC 60 Hz.

3. What controls all the circuits to the electric dryer motor?

   a. door switch.
   b. timer switch.
   c. thermostat switch.
   d. selector switch.

4. What device delays closing the heat element circuit until the electric dryer motor is running at full speed?

   a. bimetallic relay.
   b. centrifugal start switch.
   c. centrifugal thermostat switch.
   d. centrifugal motor switch.

5. What device on an electric dryer is controlled by the centrifugal motor switch and is used to close the circuit to the heater element?

   a. heat element relay switch.
   b. solenoid relay switch.
   c. timer motor relay switch.
   d. 3-cycle relay switch.

6. On a 3-cycle electric dryer, the relay switch is a:

   a. double-pole, single-throw relay switch.
   b. single-pole, single-throw relay switch.
   c. single pole switch.
   d. double pole switch.

7. Which of the following procedures are used to reassemble the sound shell of a garbage disposer?

   a. back off lock nuts then advance.
   b. snap screws together and tighten screws.
   c. tap machine bolts ¼ inch in size.
   d. snap tabs together and reinstall center clamp.

8. If the garbage disposer motor will not run because of an inoperative capacitor, what can be done?

   a. lubricate.
   b. replace the capacitor.
   c. change the dialectric.
   d. adjust plate areas.

9. What device may a faulty switch on a garbage disposal be checked with?

   a. a voltmeter.
   b. a wattmeter.
   c. aan ammeter.
   d. an ohmmeter.

10. What size fuse should be used for a garbage disposer branch circuit?

   a. 15 amp.
   b. 20 amp.
   c. 30 amp.
   d. 50 amp.

LAP TEST ANSWER KEY: OPERATION OF AN ELECTRIC CLOTHES DRYER

1. B
2. B
3. A
4. D
5. B
6. A
7. A
8. B
9. B
10. B

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Learning Activity Package

Student: __________________

Date: __________________

PERFORMANCE ACTIVITY: Disassembly of an Electric Clothes Dryer

OBJECTIVES:

Disassemble an automatic clothes dryer.

Identify component parts of an electric clothes dryer.

EVALUATION PROCEDURE:

Instructor will examine the disassembled appliance for correct disassembly and parts identification in accordance with the attached checklist.

Score at least 80% on a written multiple-choice test.

RESOURCES:

Checklist: Disassembly of an Electric Clothes Dryer.
Tools and electric clothes dryer.
Service Manuals for the appliance.

PROCEDURE:

1. Follow the steps on the attached Checklist: Disassembly of an Electrical Clothes Dryer.
2. Complete the multiple-choice test items for this LAP.
3. Check your answers with the test key. If your answers are all correct, record your time for completing this LAP on your SPR. If you have missed any questions, try to find out why you missed the test items. If you have any further problems, check with your instructor. When you have correctly completed all the test items, you may record your time on your SPR.

Principal Author(s): T. Ziller

CHECKLIST: DISASSEMBLY OF AN ELECTRIC CLOTHES DRYER

____ 1. Turn off and disconnect electrical power.

____ 2. Remove cabinet back.

____ 3. Disconnect electrical pigtail.

____ 4. Remove motor.

____ 5. Disconnect and remove timer assembly. (Identify wires.)

____ 6. Disconnect and remove heating element.

____ 7. Remove cabinet side panels.

____ 8. Remove blower assembly.

____ 9. Disconnect drum supporting frame and remove drum.

____ 10. Identify and label each part.

____ 11. Have the instructor check the identification.

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LAP TEST: DISASSEMBLY OF AN ELECTRIC CLOTHES DRYER

1. What number below identifies the Rocker switch as shown in Fig. 10 (electric dryer)?

   a. 33
   b. 31
   c. 20
   d. 16

2. What number below identifies the Timer Assembly as shown in Fig. 10 (electric dryer)?

   a. 24
   b. 20
   c. 23
   d. 21

3. What number below identifies the Control knob assembly as shown in Fig. 10 (electric dryer)?

   a. 31
   b. 18
   c. 30
   d. 17

4. In Fig. 10 (electric dryer) identify the latch with the number below.

   a. 44
   b. 33
   c. 39
   d. 97

5. What number below identifies the shaft and plate assembly as shown in Fig. 10 (electric dryer)?

   a. 73
   b. 51
   c. 78
   d. 58

6. What number below identifies the thermostat as shown in Fig. 10 (clothes dryer)?

   a. 52
   b. 51
   c. 58
   d. 81

7. In Fig. 10 of an electric dryer, what number below identifies the drum assembly?

   a. 92
   b. 68
   c. 54
   d. 67

8. What number below identifies the blower wheel and set screw as shown in Fig. 10 (electric dryer)?

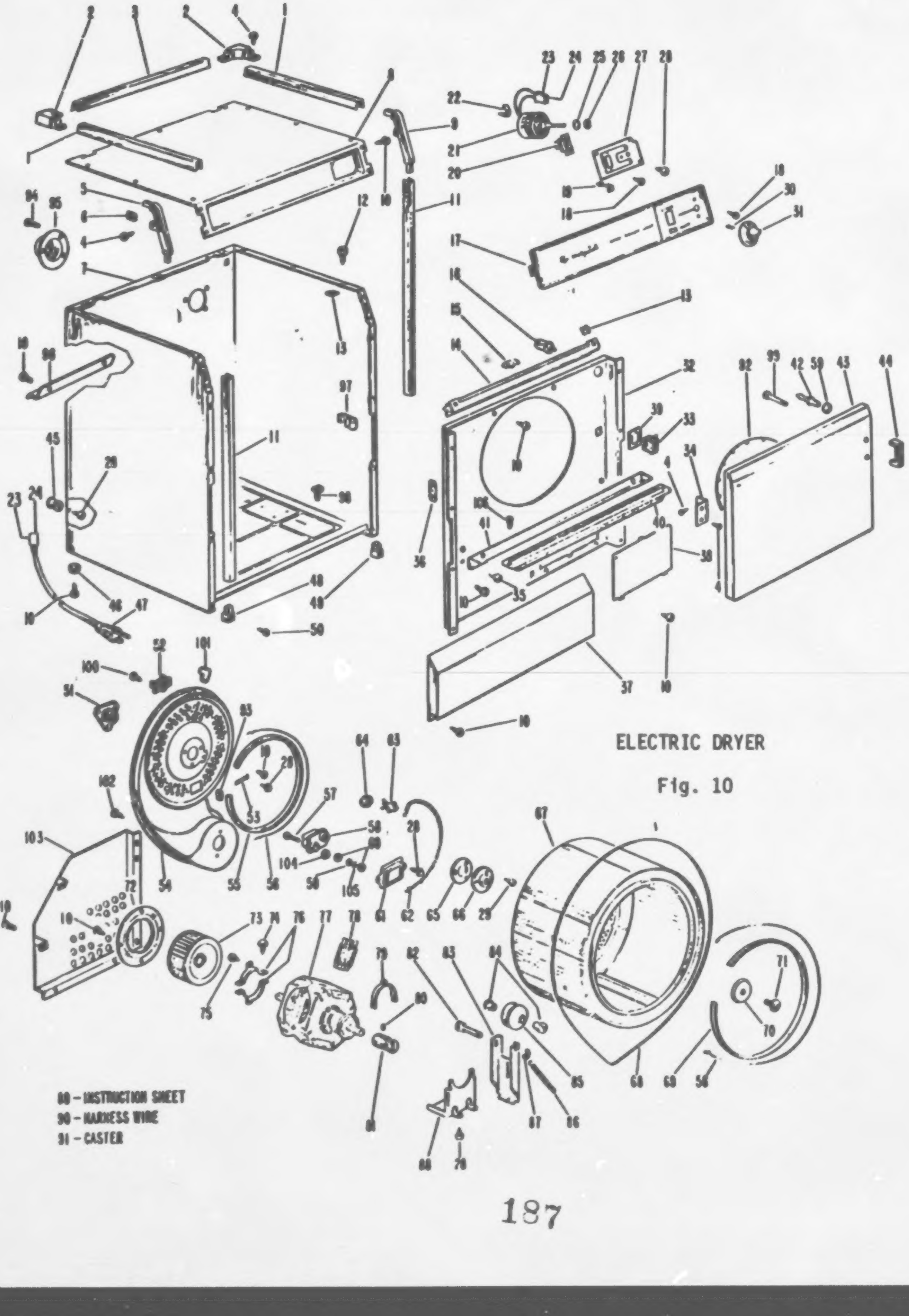
   a. 95
   b. 72
   c. 70
   d. 73

9. In Fig. 10 of an electric dryer, what number below identifies the motor assembly?

   a. 73
   b. 77
   c. 72
   d. 67

10. What number below identifies the start switch as shown in Fig. 10 (electric dryer)?

   a. 58
   b. 78
   c. 63
   d. 52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ELECTRIC DRYER

Fig. 10

88 - INSTRUCTION SHEET
90 - HARNESS WIRE
91 - CASTER

LAP TEST ANSWER KEY: DISASSEMBLY OF AN ELECTRIC CLOTHES DRYER

1. C
2. D
3. A
4. B
5. B
6. A
7. D
8. D
9. B
10. B

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Learning Activity Package

Student: ____________________

Date: ____________________

PERFORMANCE ACTIVITY: Diagnosis of Malfunctions in an Electric Clothes Dryer

OBJECTIVE:

Diagnose malfunctions in an electric clothes dryer, using appropriate tools and recommended procedures.

EVALUATION PROCEDURE:

Electrical values found during diagnosis are consistent with specifications found on the manufacturer's name plate.

Successfully complete at least 80% of the items on a multiple-choice test about this LAP.

RESOURCES:

Checklist: Diagnosis of Malfunctions - Electric Clothes Dryer.
Tools, test equipment, work order form and electric clothes dryer.
Service Manuals for the appliance.

PROCEDURE:

1. Follow the steps on the attached Checklist: Diagnosing Malfunctions: Electric Clothes Dryer.
2. Complete the multiple-choice test items for this LAP.
3. Check your answers with the test key. If your answers are all correct, record your time for completing this LAP on your SPR. If you have missed any questions, try to find out why you missed the test items. If you have any further problems, check with your instructor. When you have correctly completed all the test items, you may record your time on your SPR.

Principal Author(s): T.Ziller

CHECKLIST: DIAGNOSIS OF MALFUNCTIONS--ELECTRIC CLOTHES DRYER

_____ 1. Complete and attach the work order form.

_____ 2. Check line cords, pigtails, etc. (Ohmmeter). Resistance: _____

_____ 3. Check power switches and electrical controls (Ohmmeter). Resistance: _____

_____ 4. Check interlocks, equipment fuses and breakers (Ohmmeter). Resistance: _____

_____ 5. Check motor (Growler and Ohmmeter). Resistance: _____ Current: _____

_____ 6. Check for defective motor brushes and bearings.

_____ 7. Check contacts and thermostats.

_____ 8. Check relays.

_____ 9. Check elements (Ohmmeter). Reistance: _____

_____ 10. Check timer mechanisms.

NOTE: Refer to service manual for specific equipment data.

_____ 11. Plug electric dryer into 230V AC 60HZ 30A.

_____ 12. Check voltage source (Voltmeter). Voltage: _____

_____ 13. Check current (Amprobe). Current: _____

_____ 14. Compute power dissipated by dryer's elements. Wattage: _____

_____ 15. Compare your values with manufacturer's figures found in the specifications.

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LAP TEST:DIAGNOSIS OF MALFUNCTIONS IN AN ELECTRIC CLOTHES DRYER

1. Premature heat failure in an electric dryer may be caused by:

   a. improper air flow or an inadequate exhaust system.
   b. thermostat misadjustment.
   c. overload relay is misaligned.
   d. thermobypass is shorted.

2. A common cause of an electric dryer motor burnout is:

   a. an open circuit.
   b. shorted wiring.
   c. thermal relay is opened.
   d. a switch is bypassed.

3. If an electric dryer does not start, a possible cause may be:

   a. the ballast is bypassed.
   b. defective transformer.
   c. a short in a switch.
   d. an open door switch circuit.

4. If an electric dryer is slow in drying, a possible cause may be:

   a. high voltage.
   b. low voltage.
   c. low resistance.
   d. high power.

5. If an electric dryer motor timer is operative but timer does not advance, a possible cause may be:

   a. thermal relay is shorted.
   b. door switch shorted.
   c. thermostat is bypassed.
   d. operating thermostat inoperative.

6. If an electric dryer drying temperature is too high, a possible cause may be:

   a. thermopile is opened.
   b. open door switch.
   c. defective inlet sensor thermostat.
   d. heat element relay.

7. If a blown fuse is found to have caused an electric dryer to not start, the dryer should be thoroughly examined for:

   a. a bypassed circuit.
   b. an open circuit.
   c. internal short circuits.
   d. an internal power loss.

8. A noisy suction fan on an electric dryer is usually caused by:

   a. inoperative bypass capacitor.
   b. a plugged lint filter.
   c. high psi in the valve.
   d. incorrect alignment.

9. Before attempting to check the interior of an electric dryer:

   a. power should be disconnected.
   b. the door should be sealed open.
   c. the door switch should be disconnected.
   d. the timer should be disconnected.

10. A loose connection on an electric terminal block, motor, switch, or timer may be the cause of:

    a. a shorted circuit.
    b. an open circuit.
    c. a closed circuit.
    d. a grounded circuit.

LAP TEST ANSWER KEY: DIAGNOSIS OF MALFUNCTIONS IN AN ELECTRIC CLOTHES DRYER

1. A
2. B
3. D
4. B
5. D
6. D
7. C
8. D
9. A
10. B

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Learning Activity Package

Student: ____________________

Date: ____________________

PERFORMANCE ACTIVITY: Repair, Service and Reassembly of an Electric Clothes Dryer

OBJECTIVES

Repair, service and reassemble an electric clothes dryer.

Order replacement parts for the electric clothes dryer.

EVALUATION PROCEDURE:

The appliance must operate properly.

Successfully complete at least 80% of the items on a multiple-choice test about this LAP.

RESOURCES:

Checklist: Repair, Service and Reassembly - Electric Clothes Dryer.
Test equipment, tools, appliance parts catalogs and requisition form.
Electric clothes dryer.
Service manuals for the appliance.

PROCEDURE:

1. Follow the steps on the attached Checklist: Repair, Service and Reassembly - Electric Clothes Dryer.
2. Complete the multiple-choice test items for this LAP.
3. Check your answers with the test key. If your answers are all correct, record your time for completing this LAP on your SPR. If you ahve missed any questions, try to find out why you missed the test items. If you have any further problems, check with your instructor. When you have correctly completed all the test items, you may record your time on your SPR.

Principal Author(s): T. Ziller

CHECKLIST: REPAIR, SERVICE AND REASSEMBLY--ELECTRIC CLOTHES DRYER

Repair & Service:

____ 1. If the power cord has an open or is shorted, replace or repair.

____ 2. If the timer switches are pitted, dress with contact file.

____ 3. If the timer switches are shorted or broken, replace switch and/or cam.

____ 4. If timer motor has a short or an open field, replace with same type and size motor.

____ 5. If any electric wires are frayed, nicked, corroded or broken; replace with same wire gauge and color code.

____ 6. If the dryer element is high or low in resistance, replace with same wattage size and type.

____ 7. If any thermostats are shorted or opened, replace with same degree setting.

____ 8. If the dryer motor has an open, short or is grounded; replace with same motor size and type.

____ 9. If any bearings are worn, replace; if dry, lubricate.

Reassemble:

____ 1. Mount dry element and connect to power terminal.

____ 2. Attach the drum.

____ 3. Mount motor and connect to electric source (use wire diagram).

____ 4. Install pulleys and belts.

____ 5. Connect timer and control leads (use wire diagram).

____ 6. Replace back splash and access panels.

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LAP TEST: REPAIR, SERVICE AND REASSEMBLY OF AN ELECTRIC CLOTHES DRYER

1. An intermittent or persistent squeak on an electric dryer is caused by what is known as a "dry belt" and can usually be corrected by:

   a. silicone lubrication on the bearing drive.
   b. graphite lubrication on the bearing drive.
   c. a thin coat of surface belt dressing on the pulleys.
   d. moistening with water.

2. To check the continuity of an electric dryer circuit in a wiring harness or any other component part, use:

   a. only battery powered tester.
   b. a pilot light tester.
   c. test leads and reverse.
   d. an externally powered continuity tester.

3. Test the safety thermostat on a dryer with a line test lamp. If lamp does not light:

   a. thermostat requires calibration.
   b. thermostat solenoid is shorted; replace.
   c. thermostat is grounded; replace.
   d. thermostat circuit is open; replace.

4. Remove electric dryer drum to check drum bearing; if it is a brownish yellow:

   a. leave as is, it is normal the grease is brownish yellow.
   b. the bearing has been destroyed because of high temperatures; replace and lubricate drum bearing.
   c. reverse bearing end for end.
   d. lubricate; it is lacking grease.

5. Which of the following remedies would be used if the electric dryer drum will not rotate?

   a. timer motor inoperative; replace.
   b. replace defective door switch.
   c. replace broken, wore or loose belt.
   d. open harness circuit; replace.

6. If an electric dryer motor does not run, a possible remedy is:

   a. motor solenoid bypassed; replace thermostat.
   b. motor centrifugal switch inoperative; replace switch.
   c. open heater circuit; replace.
   d. replacing overload protector.

7. An inoperative electric dryer drum lamp may be corrected by:

   a. adjust door switch.
   b. bypass drum lamp.
   c. replacing door switch.
   d. remove drum switch.

8. If heat element is touching a metal part in the electric dryer cabinet, what should be done?

   a. heat element needs to be replaced.
   b. the heat element needs to be calibrated.
   c. the dryer must be grounded.
   d. nothing needs to be done; normal condition.

9. If the electric dryer motor runs when the door is open, check for:

   a. motor centrifugal switch for open contacts.
   b. timer motor for function and timer for welded contacts.
   c. door switch for function and that the lever actuating switch is adjusted properly.
   d. open relay coil and test switch contacts for continuity.

10. If electric dryer germicidal bulb does not light, check:

   a. calibrated door switch.
   b. defective door switch; replace.
   c. bypass germicidal bulb.
   d. remove drum switch.

LAP TEST ANSWER KEY: REPAIR, SERVICE AND REASSEMBLY OF AN ELECTRIC CLOTHES DRYER

1. C
2. D
3. D
4. B
5. C
6. D
7. C
8. C
9. C
10. B

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Learning Activity Package

Student: ____________________

Date: ____________________

PERFORMANCE ACTIVITY: Operation of a Gas Clothes Dryer

OBJECTIVES:

Describe the operation of gas clothes dryer's electrical system.

Describe the operation of gas clothes dryer's gas system.

Draw a schematic diagram of the electrical circuit for the gas dryer.

EVALUATION PROCEDURE:

Student is to write a description about the operation of a gas clothes dryer's electrical system using simple schematics and describe the gas system that is consistent with the attached checklist.

Successfully complete at least 80% of the items on a multiple-choice test about this LAP.

RESOURCES:

Checklist: Operation of Gas Clothes Dryer.
Clothes dryer.
Home Appliance Servicing, Anderson.

PROCEDURE:

1. Review pages 405-433 in Home Appliance Servicing.
2. Operate the appliance and observe the characteristics of the appliance following the steps listed on the attached Checklist: Operation of a Gas Clothes Dryer.
3. Write a description of a gas clothes dryer explaining both the gas and electrical systems using simple schematic diagrams.
4. Complete the multiple-choice test items for this LAP.
5. Check your answers with the test key. If your answers are all correct, record your time for completing this LAP on your SPR. If you have missed any questions, try to find out why you missed the test items. If you have correctly completed all the test items, you may record your time on your SPR.

Principal Author(s): T. Ziller

CHECKLIST: OPERATION OF A GAS CLOTHES DRYER

_____ 1. Set all control switches and values "off".

_____ 2. Connect dryer to gas and electric (230V 60HZ 30A) sources; also, connect to exhaust vent.

_____ 3. Turn gas regulator on and light the pilot.

_____ 4. Set timer control to one of the drying times and push to start.

NOTE: A split phase motor operates this appliance. At 75% of the motor speed the burner ignites. The fan and drum is mounted directly to the motor's stator.

_____ 5. Adjust air shutter for proper flame characteristics.

_____ 6. Set timer to all heat settings.

_____ 7. Check door switch and other heat controls.

_____ 8. Check lighting circuit.

_____ 9. Turn all controls "off" and disconnect from power and gas sources.

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LAP TEST: OPERATION OF A GAS CLOTHES DRYER

1. What gas dryer device(s) provides a parallel electrical circuit that by-passes the ignitor contacts and functions only when the ignitor contacts become insulated with lint?

   a. power regulator.
   b. current limitor.
   c. voltage divider.
   d. diode and resistor assembly.

2. What gas dryer device functions to open and close the solenoid valve?

   a. bypass ignitor.
   b. main dryer valve.
   c. pressure regulator.
   d. thermocouple.

3. What gas dryer device controls the flow of gas to the main burner?

   a. solenoid valve.
   b. baso valve.
   c. main dryer valve.
   d. thermocouple.

4. What device controls the flow of gas to the pilot and the main burner assemblies?

   a. solenoid valve.
   b. baso valve.
   c. pressure regulator.
   d. thermostat.

5. What gas dryer device shuts off the gas if there should be a mechanical failure of the main burner solenoid?

   a. unlatch solenoid.
   b. catch solenoid.
   c. emergency solenoid.
   d. bypass solenoid.

6. If the diaphragm in the regulator should rupture, what gas dryer device functions to restrict escaping gas to maximum of one cubic foot per hour?

   a. leak limitor.
   b. after-burner.
   c. leak regulator.
   d. bypass regulator.

7. What device on a gas dryer is designed to regulate the flow of gas so that a uniform pressure is present at the burner control valve at all times?

   a. thermocouple.
   b. main dryer valve.
   c. pressure regulator.
   d. main burner solenoid.

8. What safety device protects the gas dryer against any possible blowback of flame from the main burner?

   a. back fire regulator.
   b. humidistat.
   c. thermocouplestat.
   d. emergency release switch.

9. What device on a gas dryer uses an electric pilot ignition functions to remove voltage from the pilot-valve solenoid and glow coil if pilot fails to light?

   a. bimetallic switch.
   b. single pole switch.
   c. warp switch.
   d. glow switch.

10. What is the source of voltage for the gas dryer blow coil on the automatic pilot assembly?

   a. voltage divider.
   b. battery.
   c. transformer.
   d. current limitor.

LAP TEST ANSWER KEY: OPERATION OF A GAS CLOTHES DRYER

1. D
2. D
3. A
4. B
5. A
6. A
7. C
8. C
9. C
10. C

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Learning Activity Package

Student: ______________________

Date: ______________________

PERFORMANCE ACTIVITY: Disassembly of a Gas Clothes Dryer

OBJECTIVES:

Disassemble a gas clothes dryer using appropriate tools.

Identify component parts of a gas clothes dryer.

EVALUATION PROCEDURE:

Instructor will examine the disassembled appliance for correct disassembly and parts identification in accordance with the attached checklist.

Successfully complete at least 80% of the items on a multiple-choice test about this LAP.

RESOURCES:

Checklist: Disassembly of a Gas Clothes Dryer.
Tools and gas clothes dryer.
Service Manuals for the appliance.

PROCEDURE:

1. Follow the steps on the attached Checklist: Disassembly of a Gas Clothes Dryer.

2. Complete the multiple-choice test items for this LAP.

3. Check your answers with the test key. If your answers are all correct, record your time for completing this LAP on your SPR. If you have missed any questions, try to find out why you missed the test items. If you have any further problems, check with your instructor. When you have correctly completed all the test items, you may record your time on your SPR.

Principal Author(s): T. Ziller

CHECKLIST: DISASSEMBLY OF A GAS CLOTHES DRYER

_____ 1. Turn off and disconnect electrical power.

_____ 2. Turn off gas at main valve.

_____ 3. Remove cabinet back.

_____ 4. Disconnect electrical pigtail.

_____ 5. Remove motor.

_____ 6. Disconnect and remove timer assembly. (Identify wires.)

_____ 7. Disconnect and remove burner assembly.

_____ 8. Remove cabinet side panels.

_____ 9. Remove blower assembly.

_____ 10. Disconnect drum supporting frame and remove drum.

_____ 11. Identify and label parts.

_____ 12. Have the instructor check the identification.

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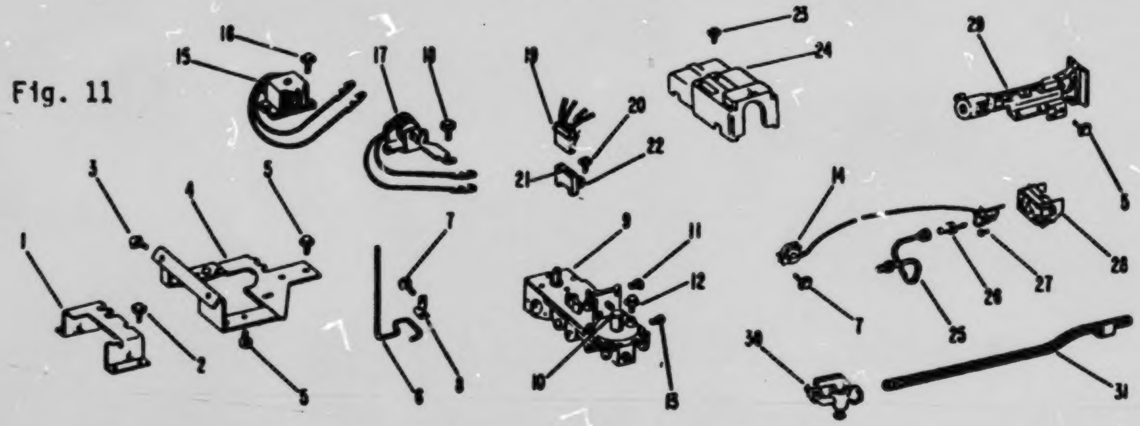
LAP TEST: DISASSEMBLY OF A GAS CLOTHES DRYER

GAS VALVE & BURNER ASSEMBLY #1

(STANDING PILOT - NA & NB MODELS)

Fig. 11



1. What number below identifies the body assembly as shown in Fig. 11 (gas dryer)?
   a. 29
   b. 9
   c. 10
   d. 28

2. What number below identifies the main burner orifice as shown in Fig. 11 (gas dryer)?
   a. 30
   b. 13
   c. 11
   d. 14

3. In Fig. 11 of a gas dryer, what number below identifies the pilot burner assembly?
   a. 29
   b. 14
   c. 10
   d. 30

4. In Fig. 11 of a gas dryer, what number below identifies the main coil?
   a. 25
   b. 17
   c. 31
   d. 15

5. What part number below identifies the main gas valve as shown in Fig. 11 (gas dryer)?

   a. 10
   b. 30
   c. 31
   d. 29

6. In Fig. 11 of a gas dryer what number below identifies the pilot orifice?

   a. 11
   b. 26
   c. 13
   d. 7

7. What number below identifies the pilot shield as shown in Fig. 11 (gas dryer)?

   a. 28
   b. 29
   c. 24
   d. 10

8. In Fig. 11 of a gas dryer, what number below identifies the unlatch coil?

   a. 15
   b. 17
   c. 31
   d. 25

9. What number below identifies the burner assembly as shown in Fig. 11 of a gas dryer?

   a. 29
   b. 31
   c. 9
   d. 14

10. In Fig. 11 of a gas dryer, what number below identifies the terminal housing?

   a. 21
   b. 17
   c. 19
   d. 15

LAP TEST ANSWER KEY: DISASSEMBLY OF A GAS CLOTHES DRYER

1. B
2. C
3. B
4. D
5. B
6. B
7. A
8. B
9. A
10. C

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Glasgow AFB, Montana 59231

File Code: 76.02.05.07.A2-0

Date Published: 9/12/75

Learning Activity Package

Student: ____________________

Date: ____________________

PERFORMANCE ACTIVITY: Diagnosis of Malfunctions in a Gas Clothes Dryer

OBJECTIVE:

Diagnose malfunctions in a gas clothes dryer following the recommended procedures and using appropriate tools.

EVALUATION PROCEDURE:

Electrical values found during diagnosis are consistent with specifications found on the manufacturer's name plate.

Successfully complete at least 80% of the items on a multiple-choice test about this LAP.

RESOURCES

Checklist: Diagnosis of Malfunctions - Gas Clothes Dryer.
Tools, test equipment, work order form and automatic clothes dryer.
Service Manuals for the appliance.

PROCEDURE:

1. Follow the steps on the attached Checklist: Diagnosing Malfunctions - Gas Clothes Dryer.
2. Complete the multiple-choice test items for this LAP.
3. Check your answers with the test key. If your answers are all correct, record your time for completing this LAP on your SPR. If you have missed any questions, try to find out why you missed the test items. If you have any further problems, check with your instructor. When you have correctly completed all the test items, you may record your time on your SPR.

Principal Author(s): T. Ziller

CHECKLIST: DIAGNOSIS OF MALFUNCTIONS--GAS CLOTHES DRYER

____ 1. Complete and attach the work order form.

____ 2. Make a thorough visual inspection.

____ 3. Check line cords, pigtails, etc. (Ohmmeter). Resistance: ____

____ 4. Check power switches and electrical controls (Ohmmeter). Resistance: ____

____ 5. Check interlocks, equipment fuses and breakers (Ohmmeter). Resistance: ____

____ 6. Check motor (Growler and Ohmmeter). Current: ____ Resistance: ____

____ 7. Check for defective motor brushes and bearings.

____ 8. Check contacts and thermostats.

____ 9. Check relays.

____ 10. Check timer mechanisms.

NOTE: Refer to service manual for specific equipment data.

____ 11. Connect dryer to a gas source.

____ 12. Check gas valves and gas leaks (soap).

____ 13. Connect to 115V 60HZ 20A.

____ 14. Light pilots and adjust for proper height.

____ 15. Ignite the burners and adjust the flame for proper flame character.

Student: ____________________ **File Code:** 76.02.05.07.A2-2

Date: ____________________ **Date Published:** 7/28/75

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LAP TEST: DIAGNOSIS OF MALFUNCTIONS IN A GAS CLOTHES DRYER

1. If a gas dryer pilot will not light, check for:

   a. high gas pressure.
   b. main burner orifice too large.
   c. air in gas line.
   d. pilot filter-adjustment screw open.

2. If a gas dryer pilot orifice or line is clogged, this may cause what condition to exist?

   a. pilot will not light.
   b. main burner ignites and flares up.
   c. motor will not start.
   d. main burner goes out repeatedly.

3. If a gas dryer main burner and pilot go out, check for:

   a. wrong size of pilot orifice.
   b. high gas pressure.
   c. defective operating switch.
   d. defective thermocouple.

4. If a gas dryer main burner goes out repeatedly, check for:

   a. pilot filter-adjustment screw opened.
   b. cycling of high-limit switch.
   c. defective safety pilot.
   d. defective thermopile.

5. If a gas dryer is noisy during operation, check for:

   a. tub locked, belt slips.
   b. locked impeller.
   c. broken idler-pulley spring.
   d. pulley loose on shaft.

6. If a gas dryer drying chamber does not turn with motor running, check for:

   a. drum rubbing against drum case.
   b. locked impeller.
   c. worn or broken belt.
   d. defective high-limit switch.

7. If a gas dryer will not shut off, check for:

   a. a defective motor.
   b. a defective high-limit switch.
   c. a defective timer control.
   d. a defective door switch.

8. If a gas dryer has a sharp blue flame, check for:

   a. improper flow of secondary air.
   b. improper flow of primary air.
   c. main burner orifice too small.
   d. wrong size of pilot orifice.

9. If a gas dryer drum turns but there is no heat, check for:

   a. a low voltage.
   b. a defective high-limit thermostat.
   c. a defective timer motor.
   d. a defective pilot-burner solenoid.

10. If a gas dryer pilot goes out when main burner comes on, check for:

    a. defective safety valve.
    b. pressure regulator not functioning properly.
    c. wrong size of pilot orifice.
    d. main burner orifice too large.

LAP TEST ANSWER KEY: DIAGNOSIS OF MALFUNCTIONS IN A GAS CLOTHES DRYER

1. C
2. A
3. D
4. B
5. D
6. C
7. C
8. B
9. D
10. B

File Code: 76.02.05.08.A2-0

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Learning Activity Package

Student: ____________________

Date: ____________________

PERFORMANCE ACTIVITY: Repair, Service and Reassembly of a Gas Clothes Dryer

OBJECTIVES:

Repair, service and reassemble a gas clothes dryer.

Order replacement parts for the gas clothes dryer.

EVALUATION PROCEDURE:

The appliance must operate properly.

Successfully complete at least 80% of the items on a multiple-choice test about this LAP.

RESOURCES:

Checklist: Repair, Service and Reassembly - Gas Clothes Dryer.
Test equipment, tools, appliance parts catalogs and requisition form.
Gas clothes dryer.
Service manuals for the appliance.

PROCEDURE:

1. Follow the steps on the attached Checklist: Repair, Service and Reassembly - Gas Clothes Dryer.

2. Complete the multiple-choice test items for this LAP.

3. Check your answers with the test key. If your answers are all correct, record your time for completing this LAP on your SPR. If you have missed any questions, try to find out why you missed the test items. If you have any further problems, check with your instructor. When you have correctly completed all the test items, you may record your time on your SPR.

Principal Author(s): T. Ziller

CHECKLIST: REPAIR, SERVICE AND REASSEMBLY--GAS CLOTHES DRYER

_______ 1. Be sure diagnosis is correct.

_______ 2. Replacement parts are on hand.

_______ 3. All tools, equipment, lubricants, etc., immediately available.

_______ 4. Check replacement parts against originals.

_______ 5. Order a new pilot oriface for the gas clothes dryer.

_______ 6. Repair or replace defective parts.

_______ 7. Lubricate bearings, bushings, controls, and movable parts.

_______ 8. Reassemble appliance. (Disassembly checklist and/or reference manuals).

_______ 9. Adjust and calibrate thermostats, timers, controls, belts, brushes, clearances, etc.

_______ 10. Check appliance for correct functioning.

_______ 11. Clean and polish appliance and complete work order.

Student: ______________________ **File Code:** 76.02.05.08.A2-2

Date: ______________________ **Date Published:** 7/28/75

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LAP TEST: REPAIR, SERVICE AND REASSEMBLY OF A GAS CLOTHES DRYER

1. What should the circumference be for proper venting pipe for a gas dryer?

   a. 2 inches.
   b. 3½ inches.
   c. 4 inches.
   d. 5 inches.

2. What should the water column pressure read to be within satisfactory range on a gas dryer regulator test?

   a. 3.7-3.8
   b. 3.4-3.6
   c. 3.1-3.3
   d. 3.6-3.8

3. What is used to determine a leak in the trap duct on a gas dryer?

   a. soap bubbles.
   b. open flame.
   c. a strong light.
   d. water.

4. A sharp blue flame on a gas dryer main burner can be corrected by:

   a. reducing the flow of secondary air.
   b. increasing the flow of primary air.
   c. reducing the flow of primary air.
   d. replace pilot orifice.

5. Test a gas dryer main burner solenoid by applying 115 volts to terminal of solenoid. If audible click is not heard:

   a. solenoid is defective; replace.
   b. solenoid is normal.
   c. solenoid is connected backward.
   d. solenoid needs 230 V.

6. To correct or prevent binding at the gas dryer pulley bearings:

   a. lightly lubricate with grease.
   b. lightly lubricate with graphite.
   c. lightly lubricate with silicone.
   d. lightly lubricate belt.

7. If a magnetic field is detected at the nut on the solenoid cover but gas dryer burner does not come on:

   a. adjust solenoid relay.
   b. reverse magnetic polarity.
   c. loosen nut slightly on the solenoid cover.
   d. complete valve body assembly is defective; replace.

8. To test operation of the gas dryer thermocouple, connect millivolt meter to pilot safety valve and light burner. For normal operation the millivolt meter should read:

   a. 9 to 16 millivolts.
   b. below 9 millivolts.
   c. 18-25 millivolts.
   d. above 30 millivolts.

9; When a wattmeter is used to determine how efficiently the mechanical system of the gas dryer is functioning, and there is too high a reading, this can indicate:

   a. direct short.
   b. mechanical binding.
   c. direct open.
   d. low voltage.

10. To check operation of the gas dryer safety valve, connect millivolt meter to pilot safety valve; if the drop-out point is less than 2 millivolts, this indicates:

   a. high voltage.
   b. normal operation.
   c. defective valve; replace.
   d. low voltage.

LAP TEST ANSWER KEY: REPAIR, SERVICE AND REASSEMBLY OF A GAS CLOTHES DRYER

1. C
2. B
3. C
4. C
5. A
6. A
7. D
8. A
9. B
10. C

Student: ______________________ File Code: 76.02.05.00.B2-2

Date: ______________________ Date Published: 11-20-74

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UNIT POST TEST: CLOTHES DRYERS

76.02.05.01

1. On an electric dryer the number of heaters energized is determined by:

   a. the thermostat switch.
   b. the timer swtich.
   c. the motor centrifugal switch.
   d. the selector switch.

2. What electric dryer device is composed of a bi-metallic disc that snaps a single-pole, single-throw or double-throw switch?

   a. fixed thermostat.
   b. adjustable thermostat.
   c. thermopile.
   d. thermocouple.

3. What device converts heat into mechanical motion, which in turn opens or closes the circuits supplying a current to the heat element on the electrical dryer?

   a. thermopile.
   b. fixed thermostat.
   c. adjustable thermostat.
   d. thermocouple.

4. What electric dryer device acts as a ballast to cut down the voltage for the ozone lamp?

   a. ozone ballast.
   b. drum light.
   c. resistor.
   d. variactor.

5. How is the electric dryer main motor protected from overheating?

   a. fuse.
   b. internal-overload protector.
   c. circuit breaker.
   d. thermostat.

76.01.05.02

6. What number below identifies the lint trap assembly as shown in Fig. 10 (electric dryer)?

   a. 92
   b. 41
   c. 40
   d. 36

7. What number below identifies the blower housing as shown in Fig. 10 (electric dryer)?

   a. 73
   b. 55
   c. 54
   d. 72

8. In Fig. 10 of an electric dryer, what number below identifies the heater coil?

   a. 62
   b. 86
   c. 55
   d. 56

9. In Fig. 10 of an electric dryer, what number below identifies the drive pulley?

   a. 73
   b. 85
   c. 81
   d. 78

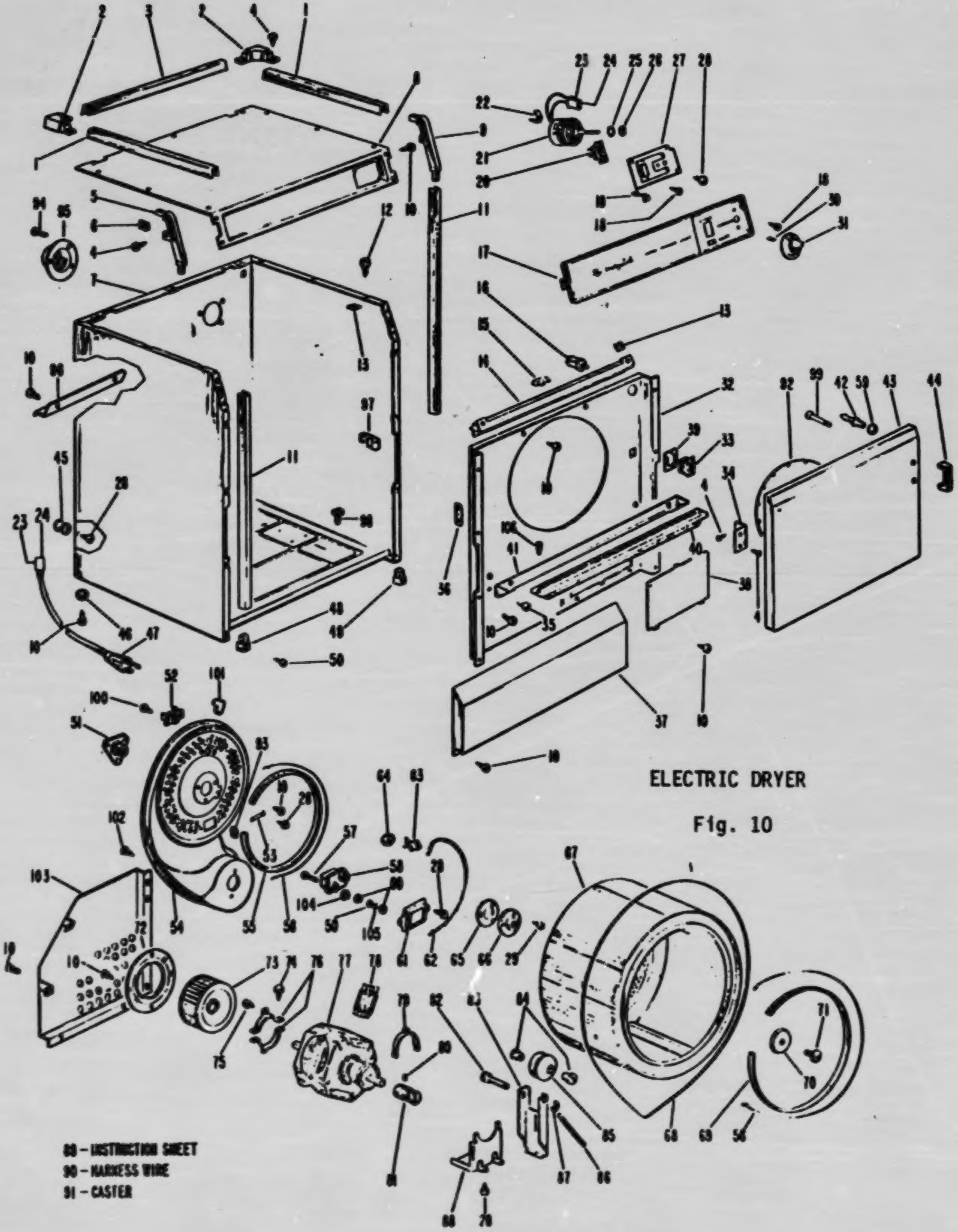
10. In Fig. 10 of an electric dryer, what number below identifies the door gasket?

   a. 92
   b. 65
   c. 55
   d. 59

76.02.05.03.

11. If an electric dryer timer runs but will not shut the dryer off, check:

   a. to see if timer motor is running slow.
   b. to see if timer is shorted.
   c. to see if R-C time in the timer has changed.
   d. for improper positioning of the stop pin.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ELECTRIC DRYER

Fig. 10

89 - INSTRUCTION SHEET
90 - HARNESS WIRE
91 - CASTER

76.02.05.03. (continued)

12. Damage to clothes in an electric dryer may be caused by:

    a. an improper drum gap.
    b. too low a thermostat setting.
    c. detergent burns caused by ozone light setting.
    d. motor rpm too high.

13. If an electric dryer motor runs but the drum does not turn, a possible cause may be:

    a. loose or broken belt.
    b. defective timer.
    c. main motor inoperative.
    d. drum seals improperly positioned.

14. If the contact points in an electric dryer timer are arced closed:

    a. the timer is shorted.
    b. the dryer will not start.
    c. the timer is grounded.
    d. the dryer will not stop.

15. An intermittent or persistant squeak in an electric dryer is caused by what is known as:

    a. "dry" socket.
    b. "dry" bearing.
    c. "dry" belt.
    d. "dry" cycle.

76.02.05.04.

16. A noisy suction fan on an electric dryer is usually corrected by:

    a. removing the pulley tension.
    b. aligning the pulleys; replacing defective belts.
    c. relieving the belt, thereby the tension.
    d. insulating the fan cage.

17. To check the continuity of an electric dryer circuit in a wiring harness or any other component part, use:

    a. only battery powered tester.
    b. a pilot light tester.
    c. test leads and reverse.
    d. an externally powered continuity tester.

76.02.05.04.(continued)

18. Test the electric dryer door circuit with a test lamp. If lamp lights, but does not light when plunger is depressed:

    a. replace switch.
    b. adjust door switch.
    c. lubricate door assembly.
    d. remove test lamp.

19. Which of the following remedies would be used if the electric dryer drum will not rotate?

    a. timer motor inoperative; replace.
    b. replace defective door switch.
    c. replace broken, wore or loose belt.
    d. open harness circuit; replace.

20. If clothes are overdry or are wrinkled at end of electric drying, correct by:

    a. replacing timer contacts.
    b. replacing heating elements.
    c. replacing thermostat.
    d. checking moisture cycle for misalignment.

76.02.05.05.

21. What device on an automatic gas dryer is used in conjunction with auxillary control thermostat having bias heaters?

    a. gas thermostats.
    b. bias thermostats.
    c. heater thermostats.
    d. cycling thermostats.

22. What size should the gas supply line be for a gas dryer?

    a. 3/4 inch.
    b. 3/8 inch.
    c. 1 inch.
    d. ½ inch.

23. What device is necessary in a gas supply line in order to shutoff the dryer gas supply without interrupting gas to other appliances?

    a. solenoid valve.
    b. shutoff valve.
    c. baso valve.
    d. main dryer valve.

76.02.05.05. (continued)

24. What device functions to interrupt the current to the gas dryer heater should the temperature of the heater housing exceed a preset limit?

    a. cycling thermostat.
    b. auxillary control thermostats.
    c. high-limit thermostat.
    d. bypass thermostat.

25. What safety device protects the gas dryer against any possible flowback of flame from the main burner?

    a. back fire regulator.
    b. humidistat.
    c. thermocouplestat.
    d. emergency release switch.

76.02.05.06.

26. What number below identifies the body assembly as shown in Fig. 11 (gas dryer)?

    a. 29
    b. 9
    c. 10
    d. 28

27. What number below identifies the main burner orifice as shown in Fig. 11 (gas dryer)?

    a. 30
    b. 13
    c. 11
    d. 14

28. In Fig. 11 of a gas dryer, what number below identifies the main coil?

    a. 25
    b. 17
    c. 31
    d. 15

29. In Fig. 11 of a gas dryer, what number below identifies the unlatch coil?

    a. 15
    b. 17
    c. 31
    d. 25

GAS VALVE & BURNER ASSEMBLY #1

(STANDING PILOT - NA & NB MODELS)

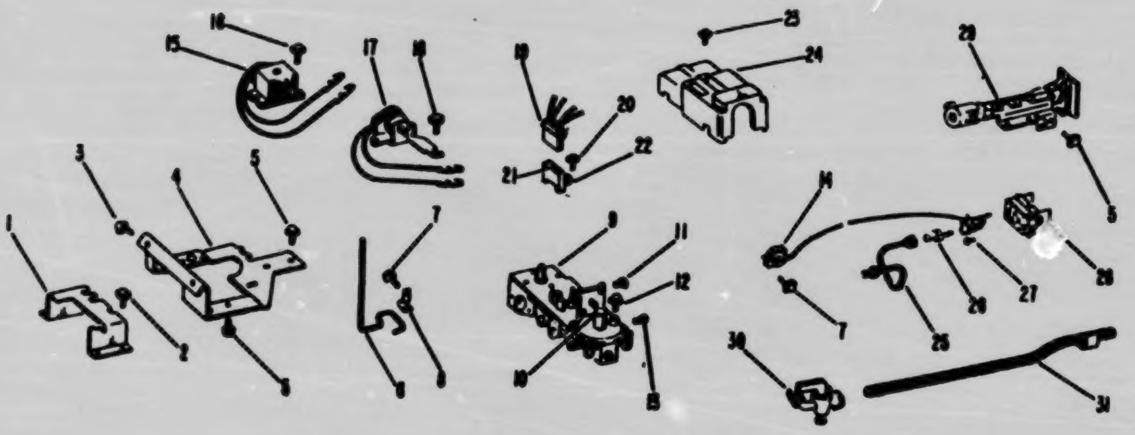
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Fig. 11

76.02.05.06. (continued)

30. What number bedow identifies the burner assembly as shown in Fig. 11 of a gas dryer?

   a. 29
   b. 31
   c. 9
   d. 14

76.02.05.07.

31. If a gas dryer motor will not start, check for:

   a. impeller loose on motor shaft.
   b. tripped overload relay.
   c. drum rubbing against drum case.
   d. dryer not properly level.

32. If a gas dryer pilot flame will not stay lit, check for:

   a. positioning of thermocouple joint in relation to pilot flame.
   b. an open capillary tube.
   c. a misaligned pilot tube.
   d. a drafty vent pipe around pilot light.

33. If a gas dryer's main burner will not light, check for:

   a. defective main burner solenoid.
   b. defective pilot orifice.
   c. faulty thermocouple current.
   d. negative feedback.

34. In gas dryers the most frequent cause for failure in the gas system is the:

   a. pilot-burner solenoid valve.
   b. main-burner solenoid valve.
   c. short circuit in the thermocouple.
   d. short circuit in the thermopile.

35. If a gas dryer motor is overheating, check for:

   a. defective high-limit thermostat.
   b. defective thermocouple.
   c. thermostat setting too high.
   d. too much current in armature.

76.02.05.08.

36. How do you check to see if a gas line to a gas dryer is bled of air?

    a. use open flame.
    b. allow air to flow until gas odor is detected.
    c. use soap bubbles.
    d. vent properly.

37. With gas dryer motor running check for continuity of auxillary switch in motor. A light indicates:

    a. motor is grounded.
    b. normal operation of switch.
    c. reversed voltage polarity.
    d. centrifugal switch or centrifugal switch mechanism is defective; replace.

38. Measuring resistance in gas dryer components such as thermostats and solenoid valves will uncover:

    a. improper voltages.
    b. reversed polarity.
    c. shorts or opens.
    d. misaligned thermostats or solenoids.

39. To discover shorts in the wire harness, a check may be made by:

    a. using an amprobe.
    b. ohmmeter.
    c. voltmeter.
    d. ammeter.

40. When using the wattmeter to check the gas dryer motor overload protector and the wattage consumption is normal but the removal of the jumper wire stops the motor, this indicates:

    a. protector is defective; replace.
    b. motor is defective; replace.
    c. wattmeter needs calibration.
    d. fuse has blown.

UNIT TEST ANSWER SHEET

POST TEST

Occupational Area: ____________________
File Code: 76.02.05.00.B2-2 ______
Name: ____________________

ANSWERS

LAP 01	1.	D	LAP 05	21.	D	41.	
	2.	A		22.	D	42.	
	3.	C		23.	B	43.	
	4.	B		24.	C	44.	
	5.	B		25.	C	45.	
LAP 02	6.	C	LAP 06	26.	B	46.	
	7.	C		27.	C	47.	
	8.	A		28.	D	48.	
	9.	C		29.	B	49.	
	10.	A		30.	A	50.	
LAP 03	11.	D	LAP 07	31.	B	51.	
	12.	A		32.	A	52.	
	13.	A		33.	A	53.	
	14.	D		34.	A	54.	
	15.	C		35.	A	55.	
LAP 04	16.	B	LAP 08	36.	B	56.	
	17.	D		37.	D	57.	
	18.	A		38.	C	58.	
	19.	C		39.	A	59.	
	20.	C		40.	A	60.	

Student: ____________ File Code: 76.02.05.00.A1-5

Date: ____________ Date Published: 11/14/74

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Family Pay Number: ____________ Sex: M F (Circle 1)

UNIT PERFORMANCE TEST: CLOTHES DRYERS

OBJECTIVE 1:

Given a malfunctioning electric and gas clothes dryer, the student will service and repair the dryer so that it functions according to the manufacturer's specifications, following safe practices and procedures.

OBJECTIVE 2:

Using appropriate tools and test equipment, the student will calculate and record amperage, voltage, resistance, and wattage of an electric and gas clothes dryer.

OBJECTIVE 3:

Using appropriate tools and test equipment, the student will connect the dryer to a gas source, and adjust the pilot and burner assemblies.

TASK:

The student will service and repair a malfunctioning electric and gas clothes dryer and, in the process, he will take and record amperage, voltage, resistance and wattage readings, using appropriate test equipment.

ASSIGNMENT:

CONDITIONS:

The student will be given a malfunctioning electric and gas clothes dryer (it may be bugged by the instructor or it may be one brought in by a customer). He will be required to service and repair the dryer in conditions similar to those in a typical appliance repair shop. He will be allowed to use any and all tools, equipment, service manuals, text books, etc., commonly found in a repair shop. He must complete it in a reasonable length of time with no assistance from the instructor(s) or students.

RESOURCES:

Tools:

Amprobe RS-3 Rotary Meter (B-A)
Soldering gun 100 to 140 watt
Adjustable Wrench
Nut Driver Set
Long Nose Pliers
Diagonal Cutters
Slip Joint Pliers
Screwdriver Set
Phillips Set
Hex & Spline Wrench Kit
Vise Grip Plier Model Size 7"
Utica Electrician's Knife, Standard Size
18" Aluminum Level
12' Steel Tape
Punch & Chisel Set, 1/2", 5/8" chisels; 3/16, 3/8, 5/32 punches
Combination Wrench Set
Hammer (Ball Peen) 12 oz.
10" Channel-lock Plier
Utility Box
VOM
Assortment of wire, fasteners and repair parts
Electric Clothes Dryer
Gas Clothes Dryer

Printed Material:

Various Repair Manuals
Manufacturer's Specification Sheets

(Checklist continued)

	CRITERION	
	Met	Not Met
Criterion: No damage results to the appliance such as scratches and dents.		
6. All connections and fastenings are properly completed.		
Criterion: The appliance connection complies with the manufacturer's specifications. The connection is mechanically fastened and structurally sound. The connection is electrically fastened and free of defects.		
7. Appliance functions according to the manufacturer's specifications.		
Criterion: Manufacturer's specifications.		
8. Uses appropriate repair part and supplies.		
Criterion: They match exactly those listed in the manufacturer's specifications.		
Objective 2:		
9. Uses test equipment properly.		
Criterion: Manufacturer's specifications.		
10. Wattage readings are accurate.		
Criterion: Manufacturer's specifications.		
11. Voltage readings are accurate.		
Criterion: Manufacturer's specifications.		
12. Amperage readings are accurate.		

(Checklist continued)

	CRITERION	
	Met	Not Met
Criterion: Manufacturer's specifications.		
13. Resistance readings are accurate.		
Criterion: Manufacturer's specifications.		
14. When applicable mathematical calculations are correct.		
Criterion: AC/DC Circuit Manuals, Westinghouse.		
Objective 3:		
15. Connects gas source to appliance.		
Criterion: Uses proper sized wrenches.		
16. Checks for gas leaks.		
Criterion: Uses safe techniques and soap.		
17. Adjust pilot assemble.		
Criterion: Pilot flame is about 3/16" in height.		
18. Adjusts burner air shutter.		
Criterion: Flame character is all blue.		
19. The appliance is repaired in a reasonable amount of time.		
Criterion: Not to exceed 4 hours.		
The student must successfully complete 17 out of 19 line items to achieve any overall score of satisfactory.		

File Code: 76.02.06.00.A2-1

Date Published: 9/26/75

Mountain-Plains Education &
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Glasgow AFB, Montana 59231

Learning Experience Guide

UNIT: DISHWASHERS

RATIONALE:

Every appliance service person is expected to service and repair various types of electric dishwashers. An effective service person must understand how a particular appliance works. It takes a great deal of skill and understanding to be a proficient service person.

PREREQUISITES:

Unit: 76.02.05 Clothes Dryers
Unit: 77.02.03 The Transformer

OBJECTIVES:

Operate, disassemble, diagnose malfunctions, repair, service, replace component parts, and reassemble an electric dish washer using service manuals and tools.

Identify dishwasher characteristics of operation and component parts.

Identify procedure for diagnosis, repair, and service of dishwashers.

RESOURCES:

Printed Materials

Appliance Service Manuals for appliances used in the program.
Catalogs, appliance supply (assortment).
Home Appliance Servicing. Edwin P. Anderson, 2nd Edition, Theodore Audel and Company, Indianapolis, Indiana, 1965.
Order Forms.
Work Order Forms.
Manufacturer's specification sheets.

Equipment

Dishwasher, automatic.

Test Equipment: Amprobe (RS-3 Rotary Meter B-A).
Meter, volt-ohm.

Principal Author(s): T. Ziller

Tools: Box, utility.
Chisels, (½" and 5/8").
Cutters, diagonal.
Gun, Soldering (100-140 watt).
Hammer, ball pein (12 oz.).

Kit, solderless terminal.
Knife, electricians.
Level, aluminum 18".

Nut driver set.
Pliers, channel-lock (10").
Plier, long nose.
Plier, slip joint.
Plier, vise grip (size 7").
Puncher (3/16", 3/8" & 5/32").

Screwdriver, blade (set).
Screwdriver, Phillips (set).
Tape, steel measuring (12 ft.).
Wrench, adjustable.
Wrench, combination set.
Wrench, hex & spline (kit).

GENERAL INSTRUCTIONS:

This unit consists of four Learning Activity Packages (LAPs). Each LAP will provide specific information for completion of a learning activity.

The general procedure for this unit is as follows:

(1) Read the first assigned Learning Activity Package (LAP).
(2) Begin and complete the first assigned LAP.
(3) Take and score the LAP test.
(4) Turn in the LAP test answer sheet.
(5) Determine the reason for any missed items on the LAP test.
(6) Proceed to and complete the next assigned LAP in the unit.
(7) Complete all required LAPs for the unit by following steps 3 through 6.
(8) Take the unit tests as described in the Unit LEG "Evaluation Procedures".
(9) Proceed to the next assigned unit.

PERFORMANCE ACTIVITIES:

.01 Operation of an Electric Dishwasher.
.02 Disassembly of an Electric Dishwasher.
.03 Diagnosis of Malfunctions in an Electric Dishwasher.
.04 Repair, Service and Reassembly of an Electric Dishwasher.

EVALUATION PROCEDURE:

When pretesting:

1. The student takes the unit multiple-choice pretest.
2. Successful completion is 4 out of 5 items for each LAP part of the pretest.
3. The student then takes a unit performance test if the unit pretest was successfully completed.
4. Satisfactory completion of the performance test is meeting the criteria listed on the performance test.

When post testing;

1. The student takes a multiple-choice unit post test and a unit performance test.
2. Successful unit completion is meeting the listed criteria for the performance test.

FOLLOW-THROUGH:

After reading this unit guide, obtain the LAP for the first assigned performance activity.

Student: ______________________ **File Code:** 76.02.06.00.A2-2

Date: ______________________ **Date Published:** 11-19-74

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UNIT PRETEST: DISHWASHERS

76.02.06.01.

1. In a spray-arm circulating dishwasher, separate circuits are provided for the:

   a. reversing relay.
   b. spray arm circulating solenoid.
   c. disconnect switch.
   d. circulating and drain pump motors.

2. What assists in the dishwasher drying process?

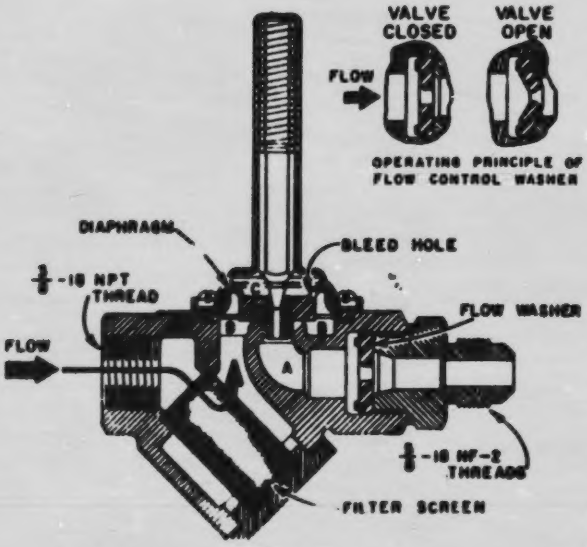
   a. low speed spinning action.
   b. dry fan on the motor.
   c. a squirrel cage vent fan.
   d. heating elements.

3. When the dishwasher timer switch is advanced, water enters the tub through:

   a. motor operated pump.
   b. solenoid-operated water-inlet valve.
   c. hydrofoil vents.
   d. floataction assembly.

4. A bleed hole in the dishwasher diaphragm washer permits (Illus. 1):

   a. water pressure at C to be greater than B.
   b. water pressure at B to be greater than C.
   c. water pressure at B and C to equalize each other.
   d. water pressure at A to be less than C.


VALVE CLOSED
VALVE OPEN
FLOW
OPERATING PRINCIPLE OF FLOW CONTROL WASHER
DIAPHRAGM
BLEED HOLE
3/8-18 NPT THREAD
FLOW WASHER
FLOW
C
A
3/8-18 NF-2 THREADS
FILTER SCREEN

Illus. 1 Solenoid-operated water-inlet for a dishwasher.

76.02.06.01. (continued)

5. Dishwasher water pressure at "A" (Illus. 1) is:

   a. water pressure.
   b. mechanical pressure.
   c. atmospheric pressure.
   d. barometric pressure.

76.02.06.02.

6. Identify by number (Fig. 12) the 1N.V. Coil on a dishwasher.

   a. 93
   b. 92
   c. 74
   d. 90

7. Identify by number (Fig. 12) the Asm. Rack Back Upper on a dishwasher.

   a. 83
   b. 84
   c. 82
   d. 88

8. Identify by number (Fig. 12) the Tub on a dishwasher.

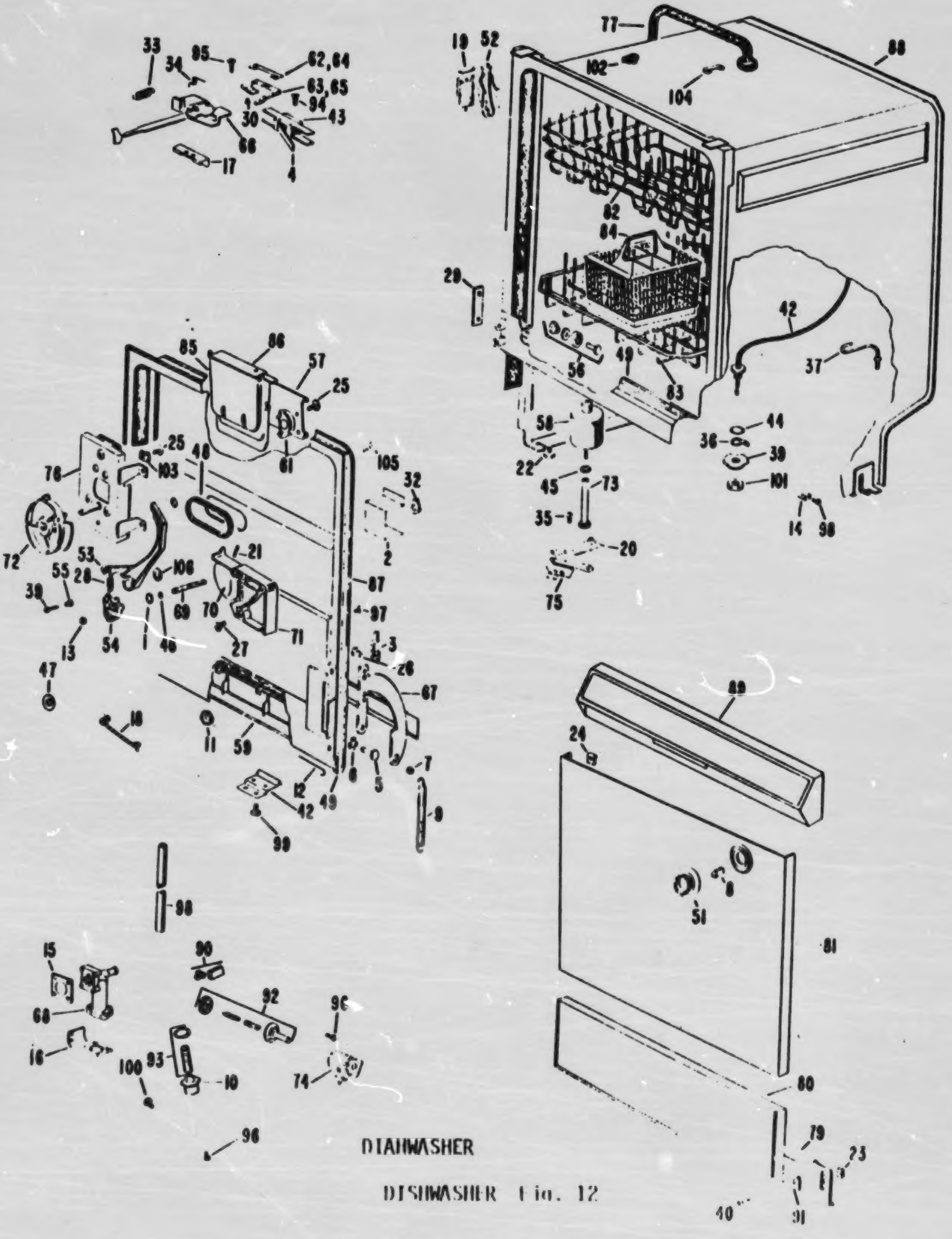
   a. 77
   b. 88
   c. 82
   d. 83

9. Identify by number (Fig. 12) the W.V. Screen and Gasket on a dishwasher.

   a. 15
   b. 74
   c. 68
   d. 93

10. Identify by number (Fig. 12) the Interlock Sw. Kit on a dishwasher.

   a. 43
   b. 4
   c. 71
   d. 76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8
81
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100
93
10
74
80
96
79
23
40
91

DIAHWASHER

DISHWASHER Fig. 12

76.02.06.03.

11. If the main motor of a dishwasher runs but skips fills intermittently, check:

    a. interlock switch.
    b. thermostat.
    c. adjustment of float switch.
    d. water level.

12. If the dishwasher runs with the door open, check:

    a. latch assembly.
    b. float switch adjustment.
    c. calrod.
    d. water level.

13. If the wash extend switch of a dishwasher fails to operate, check:

    a. double throw double pole switch.
    b. pushbutton switch.
    c. rotary switch.
    d. single pole single throw switch

14. If a dishwasher skips to the rinse cycle when set for "normal wash" cycle, it will be necessary to:

    a. check the lever solenoid.
    b. check the voltage on timer motor.
    c. check the timer cam.
    d. check calrod thermostat.

15. If the detergent cup in a dishwasher fails to trip or trips sluggishly resulting in poor washability, check:

    a. pushbutton switch.
    b. timer control.
    c. detergent cam.
    d. power source.

76.02.06.04.

16. If the dishwasher shaded pole motor, when not installed on pump housing, has end play:

    a. motor requires calibration.
    b. replace motor.
    c. this is normal.
    d. motor is not grounded, replace.

76.02.06.04. (continued)

17. If the dishwasher rinse dispenser is leaking and cannot be repaired by tightening bottom mounting screw inside dishwasher:

    a. entire tank assembly must be replaced.
    b. use a rubber gasket.
    c. replace the silicone washer.
    d. remover dispenser.

18. If there is a small intermittent leak in the stand pipe caused by the dishwasher float bobbing up and down:

    a. float defective, replace.
    b. replace stand pipe.
    c. install a deflector.
    d. plug leak with silicone.

19. If water hammer noise is generated by the abrupt closing of a dishwasher water valve:

    a. close more or open more to change pressure band.
    b. secure piping to stop noise.
    c. install water hammer eliminator or a pressure reducer.
    d. high temperature, set water-heater temperature to 130° F.

20. If the dishwasher operates in the "short wash" cycle only, regardless of button pressed, it is necessary to:

    a. replace open calrod.
    b. replace pushbutton switch if there is resistance.
    c. replace timer open timer control.
    d. replace open pushbutton switch.

UNIT TEST ANSWER SHEET

PRETEST

Occupational Area: ______________________

File Code: 76.02.06.00.A2-2

Name: ______________________

ANSWERS

LAP 01	1.	D	21.		41.	
	2.	D	22.		42.	
	3.	B	23.		43.	
	4.	C	24.		44.	
	5.	C	25.		45.	
LAP 02	6.	C	26.		46.	
	7.	C	27.		47.	
	8.	B	28.		48.	
	9.	D	29.		49.	
	10.	A	30.		50.	
LAP 03	11.	C	31.		51.	
	12.	A	32.		52.	
	13.	C	33.		53.	
	14.	C	34.		54.	
	15.	C	35.		55.	
LAP 04	16.	C	36.		56.	
	17.	A	37.		57.	
	18.	C	38.		58.	
	19.	C	39.		59.	
	20.	D	40.		60.	

File Code: 76.02.06.01.A2-0

Date Published: 9/26/75

Mountain-Plains Education &
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Learning Activity Package

Student: ____________________

Date: ____________________

PERFORMANCE ACTIVITY: Operation of an Electric Dishwasher

OBJECTIVES:

Describe the operation of an electric dishwasher.

Draw a schematic diagram of the electric circuits for an electric dishwasher.

EVALUATION PROCEDURE:

Student is to write a description about the operation of an electric dishwasher using schematic diagrams that is consistent with the attached checklist.

Successfully complete at least 80% of the items on a multiple-choice test about this LAP.

RESOURCES:

Checklist: Operation of an Electric Dishwasher.
Dishwasher
Home Appliance Servicing, Anderson.

PROCEDURES:

1. Read and study carefully the information found on pages 462-475 in Home Appliance Servicing.
2. Operate the appliance and observe the characteristics of the appliance following the steps listed on the attached checklist: Operation of an Electric Dishwasher.
3. Write a discription of an electric dishwasher explaining the electrical system using simple schematics.
4. Complete the multiple-choice test items for this LAP.
5. Check your answers with the test key. If your answers are all correct, record your time for completing this LAP on your SPR. If you have missed any questions, try to find out why you missed the test items. If you have any further problems, check with your instructor. When you have correctly completed all the test items, you may record your time on your SPR.

Principal Author(s): T. Ziller

CHECKLIST: OPERATION OF AN ELECTRIC DISHWASHER

____ 1. Turn all controls "off".

____ 2. Connect dishwasher to water, sewer and electrical sources (115V 60HZ 20A and fused).

____ 3. Set timer and cleaning controls for the longest timed clean cycle.

____ 4. Turn dishwasher "on".

NOTE: The motor is a shaded pole motor which drives the washer's water pumps.

____ 5. Check soap dispenser for proper operation.

____ 6. Check drying cycle operation.

NOTE: Drying cycle starts immediately after the wash cycle. After the dry cycle is finished the timer automatically turns itself "off".

____ 7. Disconnect from utilities sources and outlets.

Student: ______________________ File Code: 76.02.06.01.A2-2

Date: ______________________ Date Published: 7/28/75

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LAP TEST: OPERATION OF AN ELECTRIC DISHWASHER

1. The reverse rotation of the impeller dishwasher motor causes:

    a. the water to surge causing back pressure on the water system.
    b. the main motor circuit to open to stop motor.
    c. the motor to short out.
    d. the drain pump to function.

2. A dishwasher timer motor:

    a. brush gear motor.
    b. is a govenor-type motor.
    c. advances a series of cams.
    d. belt-and-pulley motor.

3. What dishwasher part functions to shut off the water in the event the proper water level is reached before the timer motor shuts off the water inlet valve?

    a. back pressure-indicator.
    b. pressure fill switch.
    c. flow washer.
    d. pressure switch.

4. In spray arm circulating dishwasher, separate circuits are provided for the:

    a. reversing relay.
    b. spray arm circulating solenoid.
    c. disconnect switch.
    d. circulating and drain pump motors.

5. What causes the dishwasher cup to be upended, spilling detergent into the tub?

    a. a micro relay.
    b. a spring loaded activator.
    c. a timer motor cam dislodged a detent lever.
    d. a water pressured plunger.

6. How is the dishwasher pump mounted on the drive motor shaft?

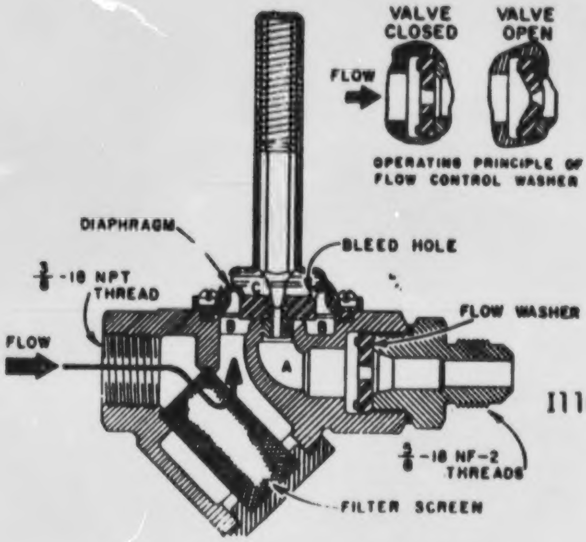
    a. drive belts.
    b. indirectly.
    c. directly.
    d. gear train.

7. When the dishwasher timer switch is advanced, water enters the tub through:

   a. motor operated pump.
   b. solenoid-operated water-inlet valve.
   c. hydrofoil vents.
   d. floatation assembly.

8. A bleed hole in the dishwasher diaphragm washer permits (Illus. 1):

   a. water pressure at C to be greater than B.
   b. water pressure at B to be greater than C.
   c. water pressure at B and C to equalize each other.
   d. water pressure at A to be less than C.


VALVE CLOSED
VALVE OPEN
FLOW
OPERATING PRINCIPLE OF FLOW CONTROL WASHER
DIAPHRAGM
BLEED HOLE
3/8 -18 NPT THREAD
FLOW WASHER
FLOW
B
C
B
A
3/8 -18 NF-2 THREADS
FILTER SCREEN

Illus. 1 Solenoid-operated water-inlet for a dishwasher.

9. Dishwasher water pressure at "A" (Illus. 1) is:

   a. water pressure.
   b. mechanical pressure.
   c. atmospheric pressure.
   d. barometric pressure.

10. When the solenoid plunger is withdrawn from the hole in the center of the dishwasher diaphragm washer (Illus. 1):

   a. water increases its speed to form a spray.
   b. water pressure at "C" pushes the diaphragm towards the valve and water flow is stopped.
   c. water stops flowing in the valve.
   d. water pressure at "C" pushes the diaphragm away from its seat in the valve and water passes through the valve.

LAP TEST ANSWER KEY: OPERATION OF AN ELECTRIC DISHWASHER

1. D
2. C
3. D
4. D
5. C
6. C
7. B
8. C
9. C
10. D

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File Code: 76.02.06.02.A2-0

Date Published: 9/26/75

Learning Activity Package

Student: ____________________

Date: ____________________

PERFORMANCE ACTIVITY: Disassembly of an Electric Dishwasher

OBJECTIVES:

Disassemble an electric dishwasher using appropriate tools.

Identify each component part of an electric dishwasher.

EVALUATION PROCEDURE:

Instructor will examine the disassembled appliance for correct disassembly and parts identification in accordance with the attached checklist.

Successfully complete at least 80% of the items on a multiple-choice test about this LAP.

RESOURCES:

Checklist: Disassembly of an Electric Dishwasher.
Tools and electric dishwasher.
Service Manuals for the appliance.

PROCEDURE:

1. Follow the steps on the attached checklist: Disassembly of an Electric Dishwasher.
2. Complete the multiple-choice test items for this LAP.
3. Check your answers with the test key. If your answers are all correct, record your time for completing this LAP on your SPR. If you have missed any questions, try to find out why you missed the test items. If you have any further problems, check with your instructor. When you have correctly completed all the test items, you may record your time on your SPR.

Principal Author(s): T. Ziller

CHECKLIST: DISASSEMBLY OF AN ELECTRIC DISHWASHER

_____ 1. Turn off power and disconnect lead-in cable.

_____ 2. Uncouple plumbing connections.

_____ 3. Remove trays (dish racks).

_____ 4. Remove deflector, strainer and impeller.

_____ 5. Unscrew and remove cabinet panel.

_____ 6. Disconnect and remove motor (identify wiring).

_____ 7. Uncouple plumbing connections and remove valve assembly.

_____ 8. Disconnect and remove control panel and timer assembly. (Identify wiring.)

_____ 9. Disconnect and remove door and door gasket.

_____ 10. Identify and label parts.

_____ 11. Have the instructor check the identifications.

Student: ______________________ File Code: 76.02.06.02.A2-2

Date: ______________________ Date Published: 7/28/75

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LAP TEST: DISASSEMBLY OF AN ELECTRIC DISHWASHER

1. Identify by number (Fig. 12) the Float on a dishwasher.

   a. 20
   b. 73
   c. 58
   d. 75

2. Identify by number (Fig. 12) the Det. Cup Hsg. on a dishwasher.

   a. 72
   b. 58
   c. 54
   d. 71

3. Identify by number (Fig. 12) the IN. V. Coil on a dishwasher.

   a. 93
   b. 92
   c. 74
   d. 90

4. Identify by number (Fig. 12) the Flood Switch on a dishwasher.

   a. 58
   b. 75
   c. 56
   d. 22

5. Identify by number (Fig. 12) the Tub Hose on a dishwasher.

   a. 77
   b. 42
   c. 37
   d. 52

6. Identify by number (Fig. 12) the Toe Kick on a dishwasher.

   a. 80
   b. 89
   c. 79
   d. 23

7. Identify by number (Fig. 12) the Asm. Rack Back Upper on a dishwasher.

   a. 83
   b. 84
   c. 82
   d. 88

8. Identify by number (Fig. 12) the W.V. Screen and Gasket on a dishwasher.

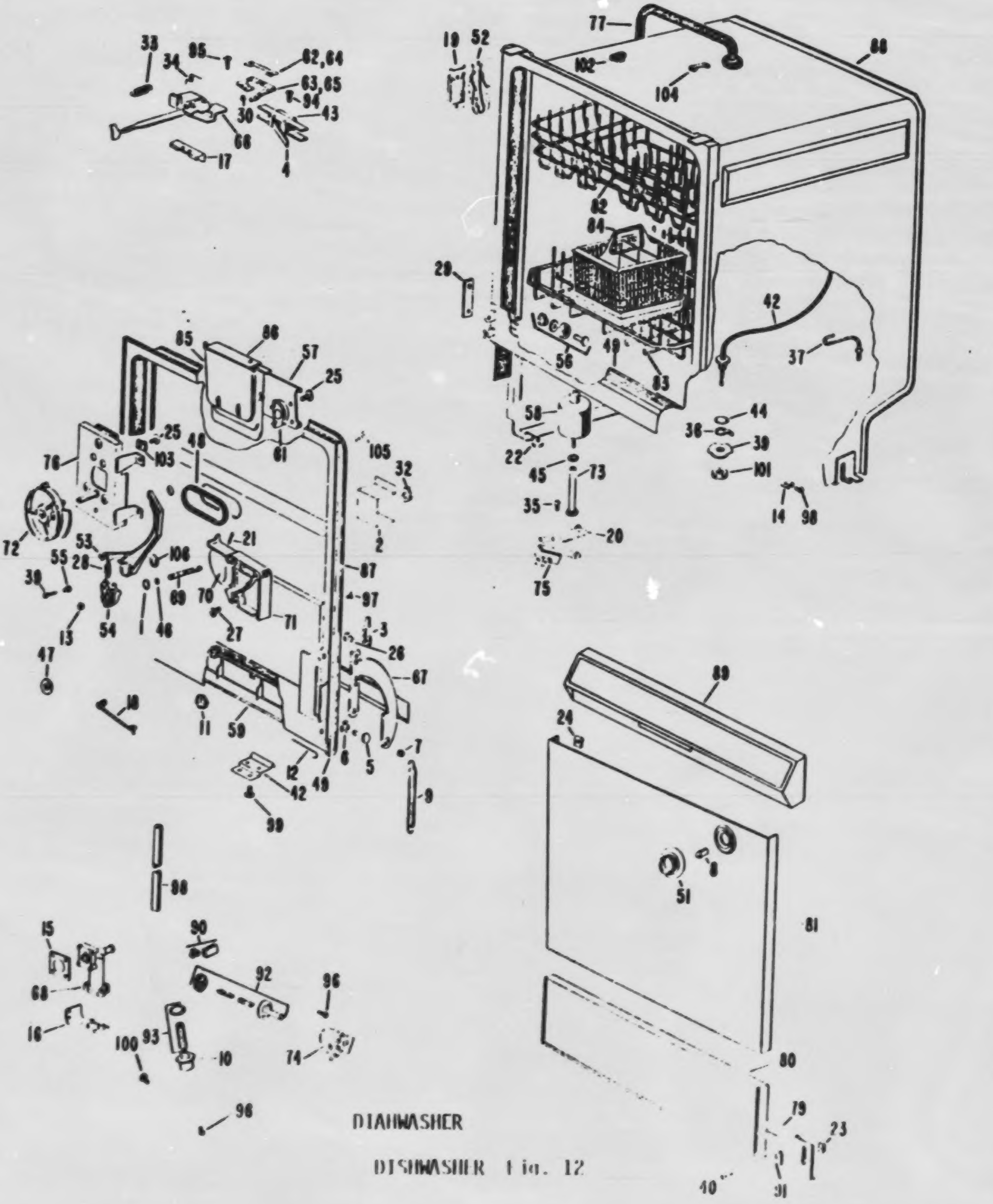
   a. 15
   b. 74
   c. 68
   d. 93

9. Identify by number (Fig. 12) the Interlock Sw. Kit on a dishwasher.

   a. 43
   b. 4
   c. 63
   d. 66

10. Identify by number (Fig. 12) the Latch Assembly on a dishwasher.

    a. 66
    b. 4
    c. 43
    d. 63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DIAHWASHER

DISHWASHER Fig. 12

LAP TEST ANSWER KEY: DISASSEMBLY OF AN ELECTRIC DISHWASHER

1. C
2. D
3. C
4. B
5. A
6. C
7. C
8. D
9. A
10. A

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File Code: 76.02.06.03.A2-0

Date Published: 9/26/75

Learning Activity Package

Student: ______________

Date: ______________

PERFORMANCE ACTIVITY: Diagnosis of Malfunctions in an Electric Dishwasher

OBJECTIVE:

Diagnose malfunctions in an electric dishwasher using appropriate tools and recommended procedures.

EVALUATION PROCEDURE:

Electrical values found during diagnosis are consistent with specifications found on the manufacturer's name plate.

Score at least 80% on a multiple-choice test.

RESOURCES:

Checklist: Diagnosis of Malfunctions - Electric Dishwasher.
Tools, test equipment, work order form and electric dishwasher.
Service Manuals for the appliance.

PROCEDURE:

1. Follow the steps on the attached Checklist: Diagnosing Malfunctions - Electric Dishwasher.
2. Complete the multiple-choice test items for this LAP.
3. Check your answers with the test key. If your answers are all correct, record your time for completing this LAP on your SPR. If you have missed any questions, try to find out why you missed the test items. If you have any further problems, check with your instructor. When you have correctly completed all the test items, you may record your time on your SPR.

Principal Author(s): T. Ziller

CHECKLIST: DIAGNOSIS OF MALFUNCTIONS--ELECTRIC DISHWASHER

____ 1. Complete and attach the work order forms.

____ 2. Make a thorough visual inspection of the appliance.

____ 3. Check line cords, pigtails, etc. (Ohmmeter). Resistance: ____

____ 4. Check power switches and electrical controls (Ohmmeter). Resistance: ____

____ 5. Check interlocks, equipment fuses and breakers (Ohmmeter). Resistance: ____

____ 6. Check motor (Growler and Ohmmeter). Current: ____ Resistance: ____

____ 7. Check for defective motor brushes and bearings.

____ 8. Check contact and thermostats.

____ 9. Check relays and valves.

____ 10. Check elements (Ohmmeter). Resistance: ____

____ 11. Check gear-boxes, gears and pumps.

____ 12. Check timer mechanisms.

NOTE: Refer to service manual for specific equipment data.

____ 13. Plug dishwasher into 115V AC 60HZ 20A.

____ 14. Check voltage source. Voltage: ____

____ 15. Check current in the element. Current: ____

____ 16. Compute power dissipated by the element. Wattage: ____

____ 17. Compare values with manufacturer's specifications.

Student: ______________________ **File Code:** 76.02.06.03.A2-2

Date: ______________________ **Date Published:** 7/28/75

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LAP TEST: DIAGNOSIS OF MALFUNCTIONS IN AN ELECTRIC DISHWASHER

1. If the main motor of a dishwasher runs but there is no calrod heat, check:

   a. power switch.
   b. door interlock switch.
   c. wiring connection to dishwasher.
   d. calrod for continuity.

2. If the main motor of a dishwasher runs but skips fills intermittently, check:

   a. interlock switch.
   b. thermostat.
   c. adjustment of float switch.
   d. water level.

3. If the dishwasher runs with the door open, check:

   a. latch assembly.
   b. float switch adjustment.
   c. calrod.
   d. water level.

4. If the calrod fails to heat in a dishwasher but the calrod checks out okay, look for:

   a. thermostat.
   b. water temperature-low.
   c. disconnected terminals.
   d. low water level.

5. If the wash extend switch of a dishwasher fails to operate, check:

   a. double-throw, double-pole switch.
   b. pushbutton switch.
   c. rotary switch.
   d. single-pole, single-throw switch.

6. If dishwasher fails to complete any cycle, check:

   a. automated overload switch.
   b. pushbutton control and relay.
   c. timer control motor.
   d. dry cycle solenoid.

7. If a dishwasher has no heated dry cycle regardless of position of rotary cycle selector switch, check:

   a. continuity of calrod.
   b. thermostat.
   c. timer control.
   d. pushbutton switch.

8. If a dishwasher operates in "normal wash" regardless of which button is pressed, check:

   a. timer control.
   b. dry extension switch.
   c. pushbutton switch.
   d. rotary switch.

9. If the dishwasher motor won't start, check:

   a. door interlock switch.
   b. water level.
   c. timer.
   d. float switch.

10. If the detergent cup in a dishwasher fails to trip or trips sluggishly resulting in poor washability, check:

    a. pushbutton switch.
    b. timer control.
    c. detergent cam.
    d. power source.

LAP TEST ANSWER KEY: DIAGNOSIS OF MALFUNCTIONS IN AN ELECTRIC DISHWASHER

1. D
2. C
3, A
4. C
5. C
6. C
7. A
8. C
9. A
10. C

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File Code: 76.02.06.04.A2-0

Date Published: 9/26/75

Learning Activity Package

Student:

Date:

PERFORMANCE ACTIVITY: Repair, Service and Reassembly of an Electric Dishwasher

OBJECTIVES:

Repair, service and reassemble an electric dishwasher.

Order a replacement part for the electric dishwasher.

EVALUATION PROCEDURE:

The appliance must operate properly.

Successfully complete at least 80% of the items on a multiple-choice test about this LAP.

RESOURCES:

Checklist: Repair, Service and Reassembly - Electric Dishwasher.
Test equipment, tools, appliance parts catalogs.
Electric dishwasher.
Service Manuals for the appliance.

PROCEDURE:

1. Follow the steps on the attached Checklist: Repair, Service and Reassembly - Electric Dishwasher.

2. Complete the multiple-choice test items for this LAP.

3. Check your answers with the test key. If your answers are all correct, record your time for completing this LAP on your SPR. If you have missed any questions, try to find out why you missed the test items. If you have any further problems, check with your instructor. When you have correctly completed all the test items, you may record your time on your SPR.

Principal Author(s): T. Ziller

CHECKLIST: REPAIR, SERVICE AND REASSEMBLY--ELECTRIC DISHWASHER

Repair & Service:

_____ 1. If the timer motor is inoperative, replace with proper size and type.

_____ 2. If any controls are faulty; replace, repair and/or calibrate.

_____ 3. If any wire conductors are frayed, nicked or worn; replace with proper wire size and color code.

_____ 4. If water hoses are cracked, split or fatigued; replace with new hoses.

_____ 5. If sump is blocked, clean and flush with cleanser.

_____ 6. If sump motor has a shorted or opened field or is grounded; repair or replace with proper motor size and type.

_____ 7. If soap/detergent dispenser is corroded, clean and/or calibrate trip mechanism.

_____ 8. If drying element is high or low in resistance, replace.

Reassemble:

_____ 1. Replace sump pump and connect hoses.

_____ 2. Replace sump motor and mount to rubber grommets on motor bracket.

_____ 3. Replace control solenoids to proper wire terminals.

_____ 4. Replace and connect dryer element.

_____ 5. Mount controls and connect to proper terminals (use wiring diagram).

_____ 6. Replace access panels.

Student: ____________________ File Code: 76.02.06.04.A2-2

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LAP TEST: REPAIR, SERVICE AND REASSEMBLY OF AN ELECTRIC DISHWASHER

1. If dishwasher motor fails to run:

   a. shorted solenoid; replace.
   b. overload is bad or winding is open; replace [illegible]r.
   c. not calibrated; adjust motor.
   d. motor bypassed; replace timer control.

2. If the dishwasher shaded pole motor, when not installed on pump housing, has end play:

   a. motor requires calibration.
   b. replace motor.
   c. this is normal.
   d. motor is not grounded; replace.

3. When removing the dishwasher pump-out solenoid in a complete disassembly, test solenoid with ohmmeter:

   a. replace coil if open.
   b. replace coil if no reading on ohmmeter for grounds.
   c. if resistance in coil; replace.
   d. coil should be calibrated.

4. If the dishwasher rinse dispenser is leaking and cannot be repaired by tightening bottom mounting screw inside dishwasher:

   a. entire tank assembly must be replaced.
   b. use a rubber gasket.
   c. replace the silicone washer.
   d. remove dispenser.

5. The dishwasher flow washer must be installed:

   a. with the flat side facing the valve body.
   b. with the flat side facing away from the valve body.
   c. around the valve body.
   d. inside the valve seat.

6. When the dishwasher latch works very hard, check:

   a. adjustment of catch and lubricate latch assembly with a good grade of non-fluid oil (white grease).
   b. replace worn latch.
   c. remove, align, and reinstall.
   d. wash with tetrachloride.

7. When no water enters the dishwasher, after making sure water is available at the valve and the coil operates on a direct test:

   a. the coil is open; replace.
   b. trouble is in the harness, timmer control, pushbutton switch, interlock switch or float switch.
   c. resistance in the coil; replace.
   d. coil requires calibration.

8. If water will not shut off, replace dishwasher timer control if:

   a. timer solenoid closed.
   b. timer contacts separated.
   c. timer contacts welded.
   d. timer solenoid has resistance.

9. If water hammer noise is generated by the abrupt closing of a dishwasher water valve:

   a. close more or open more to change pressure band.
   b. secure piping to stop noise.
   c. install water hammer eliminator or a pressure reducer.
   d. high temperature, set water-heater temperature to 130° F.

10. If the dishwasher operates in the "short wash" cycle only, regardless of button pressed, it is necessary to:

    a. replace open calrod.
    b. replace pushbutton switch if there is resistance.
    c. replace timer-open timer control.
    d. replace open pushbutton switch.

LAP TEST ANSWER KEY: **REPAIR, SERVICE AND REASSEMBLY OF AN ELECTRIC DISHWASHER**

1. B
2. C
3. A
4. A
5. A
6. A
7. B
8. C
9. C
10. D

Student: ____________________ File Code: 76.02.06.00.B2-2

Date: ____________________ Date Published: 11-20-74

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UNIT POST TEST: DISHWASHERS

76.02.06.01.

1. Recommended dishwasher water temperature, received directly from the hot water tank, is:

   a. 130° F.
   b. 140° to 160° F.
   c. 170° to 200° F.
   d. 110° to 125° F.

2. What acts as a fan on an impeller dishwasher?

   a. main motor impeller driven at a low speed.
   b. timer motor driven at a high speed.
   c. a universal motor driven at a low speed.
   d. main motor impeller driven at a high speed.

3. What assists in the dishwasher drying process?

   a. low speed spinning action.
   b. dry fan on the motor.
   c. a squirrel cage vent fan.
   d. heating elements.

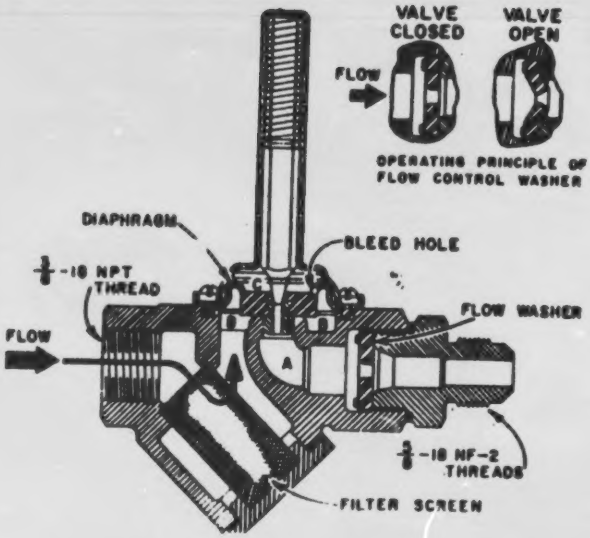
4. What type of motor protector is used for a dishwasher motor to prevent overheating?

   a. circuit breaker.
   b. fuse.
   c. fixed thermostat.
   d. timer-delay.

5. The area of dishwasher diaphragm in contact with the water pressure at "C" (Illus. 1)

   a. is equal to the area at B, forcing the diaphragm downward to seat firmly on the valve seat.
   b. is less than the area at B, forcing the diaphragm downward to seat firmly on the valve seat.
   c. is greater than the area at B, forcing the diaphragm downward to seat firmly on the valve seat.
   d. is less than the area at "A", forcing the diaphragm downward to seat firmly on the valve seat.

Illustration on page 2.


VALVE CLOSED
VALVE OPEN
FLOW
OPERATING PRINCIPLE OF FLOW CONTROL WASHER
DIAPHRAGM
BLEED HOLE
$\frac{3}{8}$-18 NPT THREAD
C
FLOW
FLOW WASHER
A
$\frac{3}{8}$-18 NF-2 THREADS
FILTER SCREEN

Illus. 1 Solenoid-operated water-inlet for a dishwasher.

76.02.06.02.

6. Identify by number (Fig. 12) the switch leaf on a dishwasher.

   a. 4
   b. 66
   c. 63
   d. 43

7. Identify by number (Fig. 12) the control dial on a dishwasher.

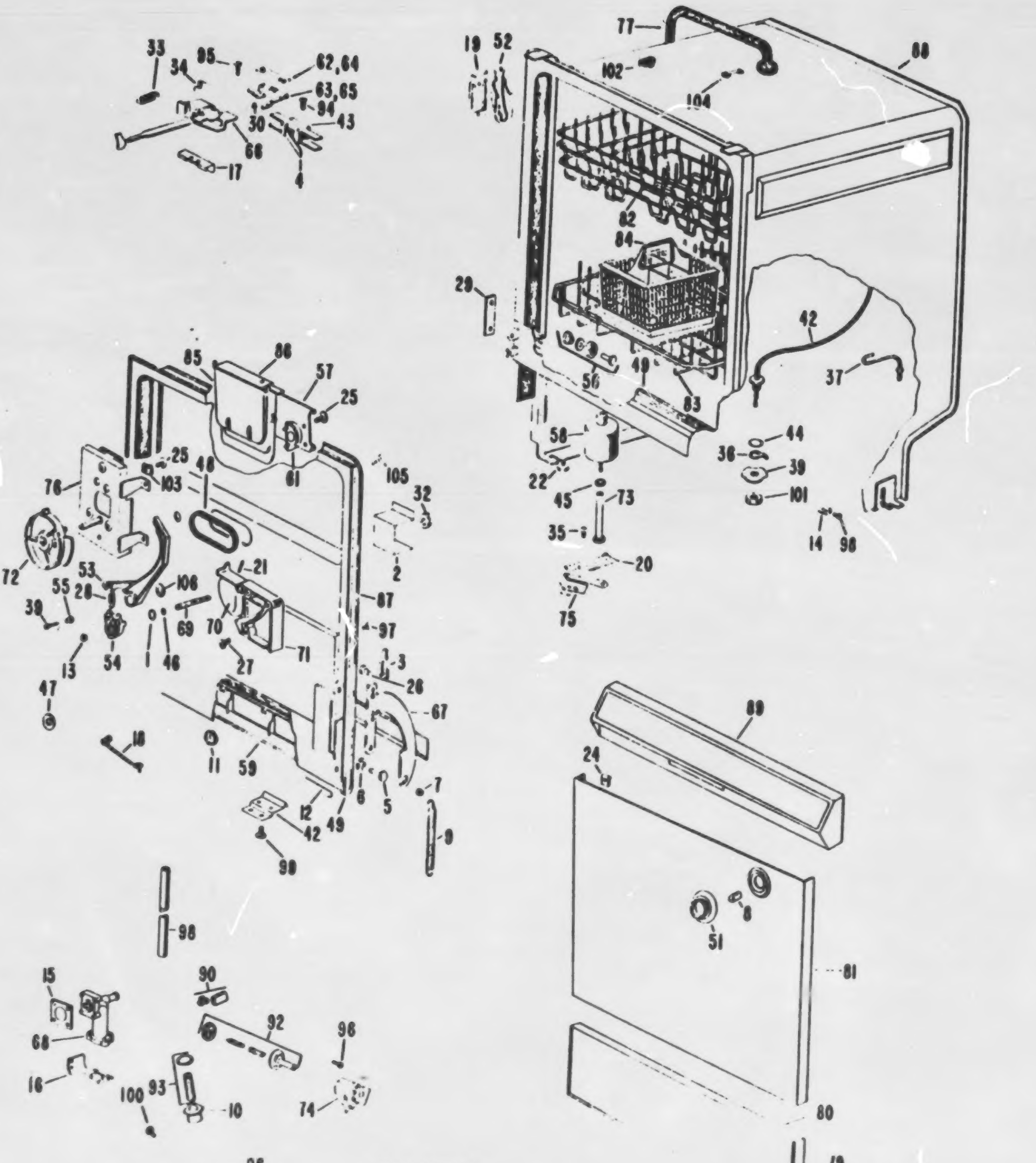
   a. 72
   b. 51
   c. 8
   d. 89

8. Identify by number (Fig. 12) the Cam Timer Det. on a dishwasher.

   a. 58
   b. 71
   c. 54
   d. 72

9. Identify by number (Fig. 12) the Tub on a dishwasher.

   a. 77
   b. 88
   c. 82
   d. 83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DIAHWASHER

96
19
23
40
91

DISHWASHER Fig. 12

76.02.06.02. (continued)

10. Identify by number (Fig. 12) the Det. Cup Release Lever on a dishwasher.

    a. 70
    b. 53
    c. 71
    d. 76

76.02.06.03.

11. When the water heat indicator light of a dishwasher fails to come on, check:

    a. thermostats.
    b. power switch.
    c. line cord.
    d. breakers.

12. If a customer complains of too much time necessary to heat water, check:

    a. temperature of water at time heating cycle begins.
    b. thermostat.
    c. power switch.
    d. temperature of water at the end of heating cycle.

13. If the dry cycle of a dishwasher does not "extend" even with proper cycle selection, check:

    a. dry extension switch.
    b. pushbutton switch.
    c. solenoid windings.
    d. drying relay windings.

14. If a dishwasher skips to the rinse cycle when set for "normal wash" cycle, it will be necessary to:

    a. check the lever solenoid.
    b. check the voltage on timer motor.
    c. check the timer cam.
    d. check calrod thermostat.

15. If too little water enters the dishwasher, check:

    a. clogged screen in inlet valve.
    b. timer control.
    c. pushbutton switch.
    d. power source.

76.02.06.04.

16. When installing a dishwasher, the hot water inlet must not be less than:

    a. 3/8 inches iron pipe or ½ O.D. copper tubing.
    b. 5/8 inch iron pipe or 1 inch O.D. copper tubing.
    c. 1/8 inch iron pipe or 3/8 inch O.D. copper tubing.
    d. ½ inch iron pipe or 5/8 O.D. copper tubing.

17. Check dishwasher motor leads to ground with an ohmmeter. A reading indicates:

    a. motor is not grounded; replace motor.
    b. a shorted solenoid; replace.
    c. a grounded motor; replace motor.
    d. motor is bypassed; replace timer control.

18. If the complaint is that of a dishwasher motor is running part way through the cycle and then stopping, the trouble is in the overload and requires:

    a. replacement of interlock switch.
    b. replacement of timer control.
    c. replacement of entire motor.
    d. a circuit breaker.

19. If there is a small intermittent leak in the stand pipe caused by the dishwasher float bobbing up and down:

    a. float defective, replace.
    b. replace stand pipe.
    c. install a deflector.
    d. plug leak with silicone.

20. If the dishwasher main motor runs but the dishwasher fills intermittently:

    a. check flow wash for clogged screen; replace screen.
    b. check timer control, replace.
    c. check interlock switch, replace.
    d. check adjustment of float switch, correct.

UNIT TEST ANSWER SHEET

POST TEST

Occupational Area:
File Code: 76.02.06.00.B2-2
Name:

ANSWERS

LAP 01	1.	B	21.		41.	
	2.	D	22.		42.	
	3.	D	23.		43.	
	4.	C	24.		44.	
	5.	C	25.		45.	
LAP 02	6.	A	26.		46.	
	7.	B	27.		47.	
	8.	D	28.		48.	
	9.	B	29.		49.	
	10.	B	30.		50.	
LAP 03	11.	A	31.		51.	
	12.	A	32.		52.	
	13.	A	33.		53.	
	14.	C	34.		54.	
	15.	A	35.		55.	
LAP 04	16.	A	36.		56.	
	17.	C	37.		57.	
	18.	C	38.		58.	
	19.	C	39.		59.	
	20.	D	40.		60.	

Student: ______________________ File Code: 76.02.06.00.A1-5

Date: ______________________ Date Published: 11/14/74

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Family Pay Number: __________ Sex: M F (Circle 1)

UNIT PERFORMANCE TEST: DISHWASHERS

OBJECTIVE 1:

Given a malfunctioning dish washer, the student will service and repair a dish washer so that it functions according to the manufacturer's specifications, following safe practices and procedures.

OBJECTIVE 2:

Using appropriate tools and test equipment, the student will calculate and record amperage, voltage, resistance, and wattage of a dish washer.

TASK:

The student will service and repair a malfunctioning dish washer and, in the process, he will take and record amperage, voltage, resistance and wattage readings, using appropriate test equipment.

ASSIGNMENT:

CONDITIONS:

The student will be given a malfunctioning dish washer (it may be bugged by the instructor or it may be one brought in by a customer). He will be required to service and repair the dish washer in conditions similar to those in a typical appliance repair shop. He will be allowed to use any and all tools, equipment, service manuals, text books, etc., commonly found in a repair shop. He must complete it in a reasonable length of time with no assistance from the instructor(s) or students.

RESOURCES:

Tools:

- Amprobe RS-3 Rotary Meter (B-A)
- Soldering gun 100 to 140 watt
- Adjustable Wrench
- Nut Driver Set
- Long Nose Pliers
- Diagonal Cutters
- Slip Joint Pliers
- Screwdriver Set
- Phillips Set
- Hex & Spline Wrench Kit
- Vise Grip Plier Model Size 7"
- Utica Electrician's Knife, Standard Size
- 18" Aluminum Level
- 12' Steel Tape
- Punch & Chisel Set, 1/2", 5/8" chisels; 3/16, 3/8, 5/32 punches
- Combination Wrench Set
- Hammer (Ball Peen) 12 oz.
- 10" Channel-lock Plier
- Utility Box
- VOM
- Assortment of wire, fasteners and repair parts
- **DISHWASHER**

Printed Material:

- Various Repair Manuals
- Manufacturer's Specification Sheets

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Student: ____________________ **File Code:** 76.02.06.00.A1-5

Date: ____________________ **Date Published:** 11/14/74

Family Pay Number: ____________ Sex: M F (Circle 1)

PERFORMANCE CHECKLIST:

OVERALL PERFORMANCE: Satisfactory_____ Unsatisfactory_____

	CRITERION	
	Met	Not Met
Objective 1:		
1. Follows safe practices and procedures.		
Criterion: No injury results to the student or the equipment and complies with OSHA requirements.		
2. Follows proper procedures for disassembly.		
Criterion: No damage results to the appliances.		
3. Diagnosis and troubleshoots malfunctions properly.		
Criterion: When repaired, the appliance functions according to the manufacturer's specifications.		
4. Reassembles the appliance properly.		
Criterion: Appliance functions according to the manufacturer's specifications and the procedures followed agree with those described in the service literature.		
5. The repaired appliance is repaired in a neat, professional manner.		

(Checklist continued)

	CRITERION	
	Met	Not Met
Criterion: No damage results to the appliance such as scratches and dents.		
6. All connections and fastenings are properly completed.		
Criterion: The appliance connection complies with the manufacturer's specifications. The connection is mechanically fastened and structurally sound. The connection is electrically fastened and free of defects.		
7. Appliance functions according to the manufacturer's specifications.		
Criterion: Manufacturer's specifications.		
8. Uses appropriate repair parts and supplies.		
Criterion: They match exactly those listed in the manufacturer's specifications.		
Objective 2:		
9. Uses test equipment properly.		
Criterion: Manufacturer's specifications.		
10. Wattage readings are accurate.		
Criterion: Manufacturer's specifications.		
11. Voltage readings are accurate.		
Criterion: Manufacturer's specifications.		
12. Amperage readings are accurate.		

(Checklist continued)

	CRITERION	
	Met	Not Met
Criterion: Manufacturer's specifications.		
13. Resistance readings are accurate.		
Criterion: Manufacturer's specifications.		
14. When applicable mathematical calculations are correct.		
Criterion: AC/DC Circuit Manuals, Westinghouse.		
15. The appliance is repaired in a reasonable time.		
Criterion: Not to exceed 4 hours.		
The student must successfully complete 13 out of 15 line items		
to achieve an overall score of satisfactory.		

File Code: 76.02.07.00.A2-1

Date Published: 9/29/75

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Learning Experience Guide

UNIT: COMPACTORS

RATIONALE:

Every appliance service person is expected to service and repair various types of electric compactors. An effective service person must understand how a particular appliance works. It takes a great deal of skill and understanding to be a proficient service person.

PREREQUISITES:

Unit: 76.02.06. Dishwashers

OBJECTIVES:

Operate, disassemble, diagnose malfunctions, repair, service, and replace component parts, and reassemble an electric compactor using service manuals and tools.

Identify electric compactor characteristics of operation and component parts.

Identify procedures for diagnosis repair and service of electric compactors.

RESOURCES

Printed Materials

Appliance Service Manuals for appliances used in the program.
Catalogs, appliance supply (assortment).
Home Appliance Servicing. Edwin P. Anderson, 2nd Edition, Theodore Audel and Company, Indianapolis, Indiana, 1965.
Order forms.
Work order forms.
Manufacturer's specification sheets.

Equipment

Compactor, electric, automatic.

Principal Author(s): T. Ziller

Test Equipment: Amprobe (RS-3 Rotary Meter B-A).
Meter, volt-ohm.

Tools: Box, utility.
Chisels, (½" and 5/8").
Cutters, diagonal.
Gun, Soldering (100-140 watt).
Hammer, ball pein (12 oz.).

Kit, solderless terminal.
Knife, electricians.
Level, aluminum 18".

Nut driver set.
Pliers, channel-lock (10").
Plier, long nose.
Plier, slip joint.
Plier, vise grip (size 7").
Puncher (3/16", 3/8" & 5/32").

Screwdriver, blade (set).
Screwdriver, Phillips (set).
Tape, steel measuring (12 ft.).
Wrench, adjustable.
Wrench, combination set.
Wrench, hex & spline (kit).

GENERAL INSTRUCTIONS:

This unit consists of four Learning Activity Packages (LAPs). Each LAP will provide specific information for completion of a learning activity.

The general procedure for this unit is as follows:

(1) Read the first assigned Learning Activity Package (LAP).
(2) Begin and complete the first assigned LAP.
(3) Take and score the LAP test.
(4) Turn in the LAP test answer sheet.
(5) Determine the reason for any missed items on the LAP test.
(6) Proceed to and complete the next assigned LAP in the unit.
(7) Complete all required LAPs for the unit by following steps 3 through 6.
(8) Take the unit tests as described in the Unit LEG "Evaluation Procedures".
(9) Proceed to the next assigned unit.

PERFORMANCE ACTIVITIES:

.01 Operation of an Electric Compactor.
.02 Disassembly of an Electric Compactor.
.03 Diagnosis of Malfunctions in an Electric Compactor.
.04 Repair, Service and Reassembly of an Electric Compactor.

EVALUATION PROCEDURE:

When pretesting:

1. The student takes the unit multiple-choice pretest.
2. Successful completion is 4 out of 5 items for each LAP part of the pretest.
3. The student then takes a unit performance test if the unit pretest was successfully completed.
4. Satisfactory completion of the performance test is meeting the criteria listed on the performance test.

When post testing.

1. The student takes a multiple-choice unit post test and a unit performance test.
2. Successful unit completion is meeting the listed criteria for the performance test.

FOLLOW-THROUGH:

After reading this unit guide, obtain the LAP for the first assigned performance activity.

Student: ____________________ File Code: 76.02.07.00.A2-2

Date: ____________________ Date Published: 11-19-74

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UNIT PRETEST: COMPACTORS

76.02.07.01.

1. Name the double-pole, double-throw switch through which the compactor motor starts and reverses.

   a. directional switch.
   b. centrifugal starting switch.
   c. unidirectional relay.
   d. pushbutton switch.

2. Name the single-pole, single-throw switch that functions to stop all power to the compactor when the drawer is opened.

   a. front drawer safety switch.
   b. rear drawer safety switch.
   c. limit switch.
   d. bypass switch.

3. Name the single-pole, single-throw switch that functions to stop power to the compactor if drawer slide is not properly engaged.

   a. solenoid winding
   b. front drawer safety switch.
   c. rear drawer safety switch.
   d. centrifugal starting switch.

4. The safety lock is a two-position type lock assembly that mechanically turns:

   a. a single-pole, single-throw bypass switch.
   b. a double pole, double throw micro switch "on" and "off".
   c. a single-pole, single-throw micro switch "on" and "off".
   d. a double pole, double throw solenoid.

5. The compactor motor runs at a speed of 1725 RPM, which drives the driving unit through a:

   a. governor.
   b. gear-type belt.
   c. brush gear.
   d. pulley arrangement.

76.02.07.02.

6. Identify by number (Fig. 15) the Switch Front Drawer Safety Switch on a compactor.

   a. 50
   b. 45
   c. 33
   d. 53

7. Identify by number (Fig. 15) the Reversing Switch on a compactor.

   a. 45
   b. 33
   c. 50
   d. 48

8. Identify by number (Fig 15) the Limit Switch on a compactor.

   a. 53
   b. 45
   c. 33
   d. 48

9. Identify by number (Fig. 15) the Relay on a compactor.

   a. 50
   b. 53
   c. 33
   d. 45

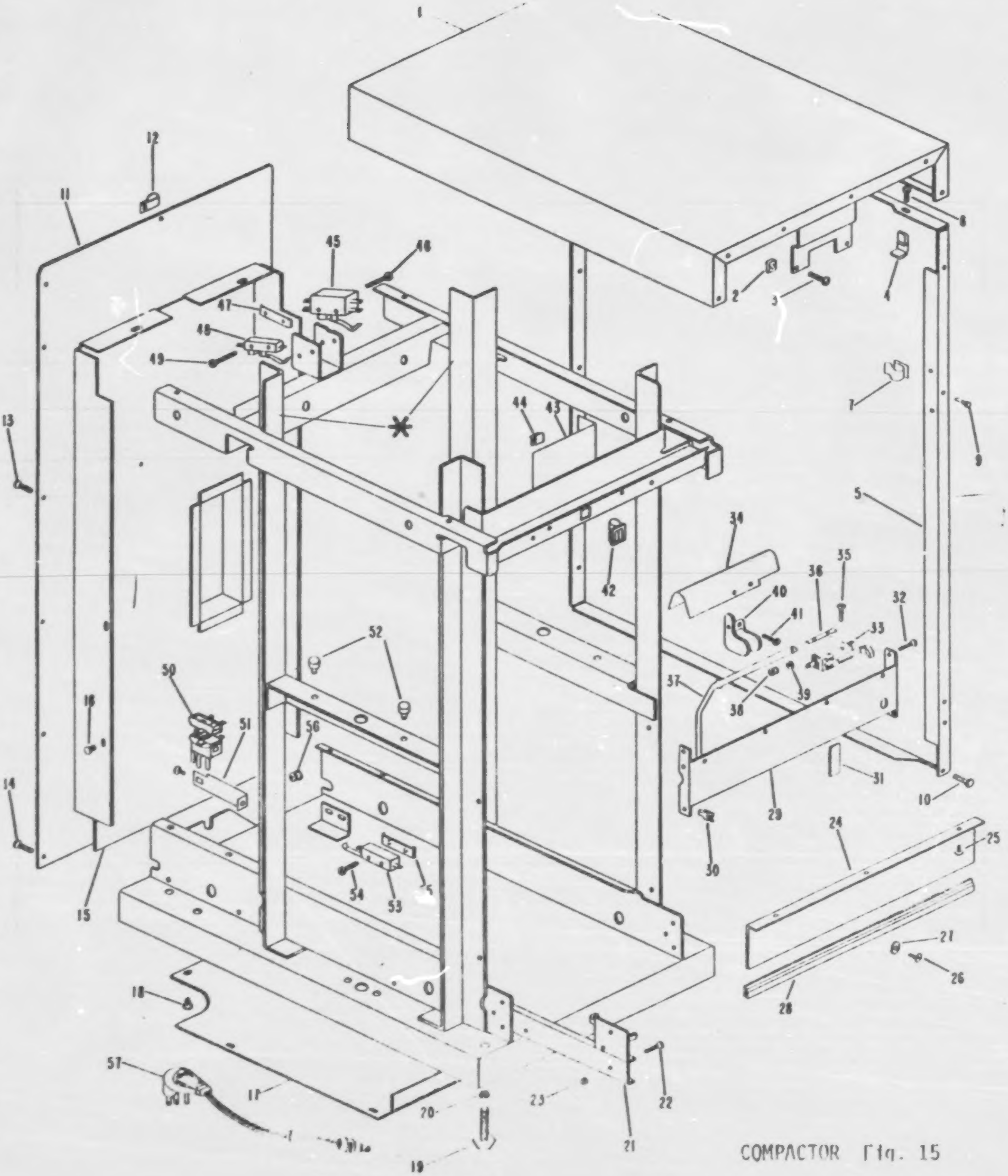
10. Identify by number (Fig. 15) the Rear Drawer Switch on a compactor.

   a. 48
   b. 33
   c. 45
   d. 53

76.02.07.03

11. If the compactor motor cuts out part way through the cycle, the trouble is most probably:

   a. a defective motor; replace.
   b. an open solenoid.
   c. a defective timer switch.
   d. the overload protector.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19

COMPACTOR Fig. 15

76.02.07.03. (continued)

12. If compactor is not properly compacting, check for:

    a. binding solenoid plunger.
    b. jammed drive system.
    c. excessively high or low voltage.
    d. capacitor motor running at low speed; replace.

13. If compactor starts and then stops when momentary start switch is released, check for:

    a. rear drawer safety switch "open."
    b. safety lock switch "open."
    c. defective relay.
    d. defective limit switch or front drawer safety switch.

14. If compactor fails to reverse, look for:

    a. no resistance.
    b. "open" unidirectional switch.
    c. "open" solenoid winding.
    d. defective relay.

15. If you receive a shock from the operating compactor, check for:

    a. an open circuit.
    b. a short circuit.
    c. a faulty drawer guide switch.
    d. a shorted transformer winding.

76.02.07.04.

16. When reinstalling the compactor self-aligning nut into cage nut retainer, make sure that:

    a. the shorter tapered portion of nut is directed upward.
    b. the longer tapered portion of nut is directed upward.
    c. the nut is parallel to the chassis.
    d. the nut has a lock washer.

17. If compactor is blowing fuses:

    a. use a 15 amp slo-blow type fuse.
    b. use a 15 amp standard type fuse.
    c. use a 10 amp standard.
    d. use the next size fuse larger than original.

76.02.07.04. (continued)

18. If a compactor requires electrical or other service involving contact or near contact with electric wires:

    a. use a voltmeter probe.
    b. turn over on its back to service.
    c. obtain a service manual.
    d. first, all power should be removed.

19. If installing a compactor as an undercounter, what clearance must be maintained from right edge of drawer to wall or adjacent objects?

    a. 3 inches.
    b. 6 inches.
    c. 10 inches.
    d. 1½ inches.

20. When installing a new safety lock on a compactor, avoid:

    a. removing lock assembly by working it out from front of control panel.
    b. removing the compactor top assembly.
    c. removing or loosening cam screw.
    d. removing the hex-shaped nut on back side of lock.

UNIT TEST ANSWER SHEET

PRETEST

Occupational Area: ____________
File Code: 76.02.07.00.A2-2
Name: ____________

ANSWERS

LAP 01	1.	A	21.		41.	
	2.	A	22.		42.	
	3.	C	23.		43.	
	4.	C	24.		44.	
	5.	B	25.		45.	
LAP002	6.	C	26.		46.	
	7.	A	27.		47.	
	8.	D	28.		48.	
	9.	A	29.		49.	
	10.	D	30.		50.	
LAP 03	11.	D	31.		51.	
	12.	C	32.		52.	
	13.	D	33.		53.	
	14.	D	34.		54.	
	15.	B	35.		55.	
LAP 04	16.	B	36.		56.	
	17.	A	37.		57.	
	18.	D	38.		58.	
	19.	B	39.		59.	
	20.	C	40.		60.	

File Code: 76.02.07.01.A2-0

Date Published: 9/29/75

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Glasgow AFB, Montana 59231

Learning Activity Package

Student: ____________________

Date: ____________________

PERFORMANCE ACTIVITY: Operation of an Electric Compactor

OBJECTIVES:

Write a description about the operation of an electric compactor.

Draw a simple schematic of the electrical circuits for a compactor.

EVALUATION PROCEDURE:

Student is to write a description about the operation of an electric compactor using the simple schematics of the circuits that are consistent with the attached checklist.

Successfully complete at least 80% of the items on a multiple-choice test about this LAP.

RESOURCES:

Checklist: Operation of an Electric Compactor.
Electric Compactor.
General Electric Service Manuals, Compactor Index.

PROCEDURES:

1. Read and study carefully the information in the index and Sections 1, 3, 5 and 6 in General Electric Service Manuals.

2. Operate the appliance and observe the characteristics of the appliance following the steps listed on the attached Checklist: Operation of an Electric Compactor.

3. Write a discription of an electric compactor explaining the electrical system using simple schematics.

4. Complete the multiple-choice test items for this LAP.

5. Check your answers with the test key. If your answers are all correct, record your time for completing this LAP on your SPR. If you have missed any questions, try to find out why you missed the test items. If you have any further problems, check with your instructor. When you have correctly completed all the test items, you may record your time on your SPR.

Principal Author(s): T. Ziller

CHECKLIST: OPERATION OF AN ELECTRIC COMPACTOR

_____ 1. Turn all controls "off".

_____ 2. Connect compactor to an electric source (115V 60HZ 15A fused).

_____ 3. Open drawer and check contents for misaligned refuse. (See operating instructions.)

_____ 4. Close draw, lock and turn switches on.

NOTE: The drive motor is a split phase motor. Forward and reverse motor direction is accomplished by switching current through the start winding in opposite directions.

_____ 5. Unlock and open the draw.

NOTE: The compressed materials were crushed with a 2,000 lb. force exerted by the ram screws.

_____ 6. Disconnect from power.

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Date: ______________________ Date Published: 7/28/75

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LAP TEST: OPERATION OF AN ELECTRIC COMPACTOR

1. What compactor device acts as a parallel by-pass circuit for the top limit switch?

   a. the start switch.
   b. the front drawer safety switch.
   c. the relay.
   d. the directional switch.

2. The compactor's two ram screws are driven by:

   a. the transmission.
   b. the pulley.
   c. the brush gear.
   d. the drive chain.

3. Name the double-pole, double-throw switch through which the compactor motor starts and reverses.

   a. directional switch.
   b. centrifugal starting switch.
   c. unidirectional relay.
   d. pushbutton switch.

4. Name the single-pole, single-throw switch that functions to stop all power to the compactor when the drawer is opened.

   a. front drawer safety switch.
   b. rear drawer safety switch.
   c. limit switch.
   d. bypass switch.

5. Name the single-pole, single-throw switch that functions to stop power to the compactor if drawer slide is not properly engaged.

   a. solenoid winding.
   b. front drawer safety switch.
   c. rear drawer safety switch.
   d. centrifugal starting switch.

6. What compactor device starts and reverses the motor?

   a. transmission.
   b. solenoid windings.
   c. unidirectional relay.
   d. relay.

7. The safety lock is a two-position type lock assembly that mechanically turns:

   a. a single-pole, single-throw bypass switch.
   b. a double pole, double throw micro switch "on" and "off".
   c. a single-pole, single-throw micro switch "on" and "off".
   d. a double-pole, double throw solenoid.

8. Name the compactor device that functions first, to start the unit and second, to stop the unit should the user find it necessary to interrupt the cycle.

   a. a toggle switch.
   b. a two-button pushbutton switch.
   c. a cam.
   d. a brush gear.

9. The compactor motor windings are protected by:

   a. manual reset overload protector.
   b. internal overload protector that is sensitive to both overheating and over-current conditions.
   c. a high-limit thermostat motor protector.
   d. a circuit breaker.

10. The compactor motor runs at a speed of 1725 RPM, which drives the driving unit through a:

   a. governor.
   b. gear-type belt.
   c. brush gear.
   d. pulley arrangement.

LAP TEST ANSWER KEY: OPERATION OF AN ELECTRIC COMPACTOR

1. A
2. D
3. A
4. A
5. C
6. D
7. C
8. B
9. B
10. B

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Date Published: 9/29/75

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Learning Activity Package

Student: ________________

Date: ________________

PERFORMANCE ACTIVITY: Disassembly of an Electric Compactor

OBJECTIVES:

Disassemble an electric compactor using appropriate tools.

Identify each component part of an electric compactor.

EVALAUTION PROCEDURE:

Instructor will examine the disassembled appliance for correct disassembly and parts identification in accordance with the attached checklist.

Successfully complete at least 80% of the items on a multiple-choice test about this LAP.

RESOURCES:

Checklist: Disassembly of an Electric Compactor.
Tools and an electric compactor.
General Electric Service Manuals for the Electric Compactor, Section 1, 2, & 4.

PROCEDURE:

1. Follow the steps on the attached Checklist: Disassembly of an Electric Compactor.
2. Complete the multiple-choice test items for this LAP.
3. Check your answers with the test key. If your answers are all correct, record your time for completing this LAP on your SPR. If you have missed any questions, try to find out why you missed the test items. If you have any further problems, check with your instructor. When you have correctly completed all the test items, you may record your time on your SPR.

Principal Author(s): T. Ziller

CHECKLIST: DISASSEMBLY OF AN ELECTRIC COMPACTOR

_____ 1. Turn off electrical power to compactor.

_____ 2. Disconnect electrical connections.

_____ 3. Remove drawer unit.

_____ 4. Remove back panel.

_____ 5. Remove back panel.

_____ 6. Remove motor.

_____ 7. Remove sprocket assembly.

_____ 3. Remove seals and bearings.

_____ 9. Remove ram assembly.

_____ 10. Identify and label the parts.

_____ 11. Have the instructor check the identifications.

Student: ______________________ File Code: 76.02.07.02.A2-2

Date: ______________________ Date Published: 7/28/75

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LAP TEST: DISASSEMBLY OF AN ELECTRIC COMPACTOR

1. Identify by number the Motor Shaft Pulley on a compactor (Fig. 13).

   a. 11
   b. 9
   c. 10
   d. 8

2. Identify by number (Fig. 13) the Drive Shaft Pulley on a compactor.

   a. 8
   b. 10
   c. 9
   d. 22

3. Identify by number (Fig. 13) the Drive Shaft Sprocket on a compactor.

   a. 23
   b. 22
   c. 21
   d. 25

4. Identify by number (Fig. 13) the Chain on a compactor.

   a. 9
   b. 24
   c. 10
   d. 22

5. Identify by number (Fig. 13) the Ram Casting on a compactor.

   a. 1
   b. 41
   c. 42
   d. 40

6. Identify by number (Fig. 14) the Pushbutton Switch on a compactor.

   a. 31
   b. 4
   c. 1
   d. 45

7. Identify by number (Fig. 14) the Lock Assembly With Key on a compactor.

   a. 1
   b. 31
   c. 6
   d. 4

8. Identify by number (Fig. 14) the Key Lock Switch.

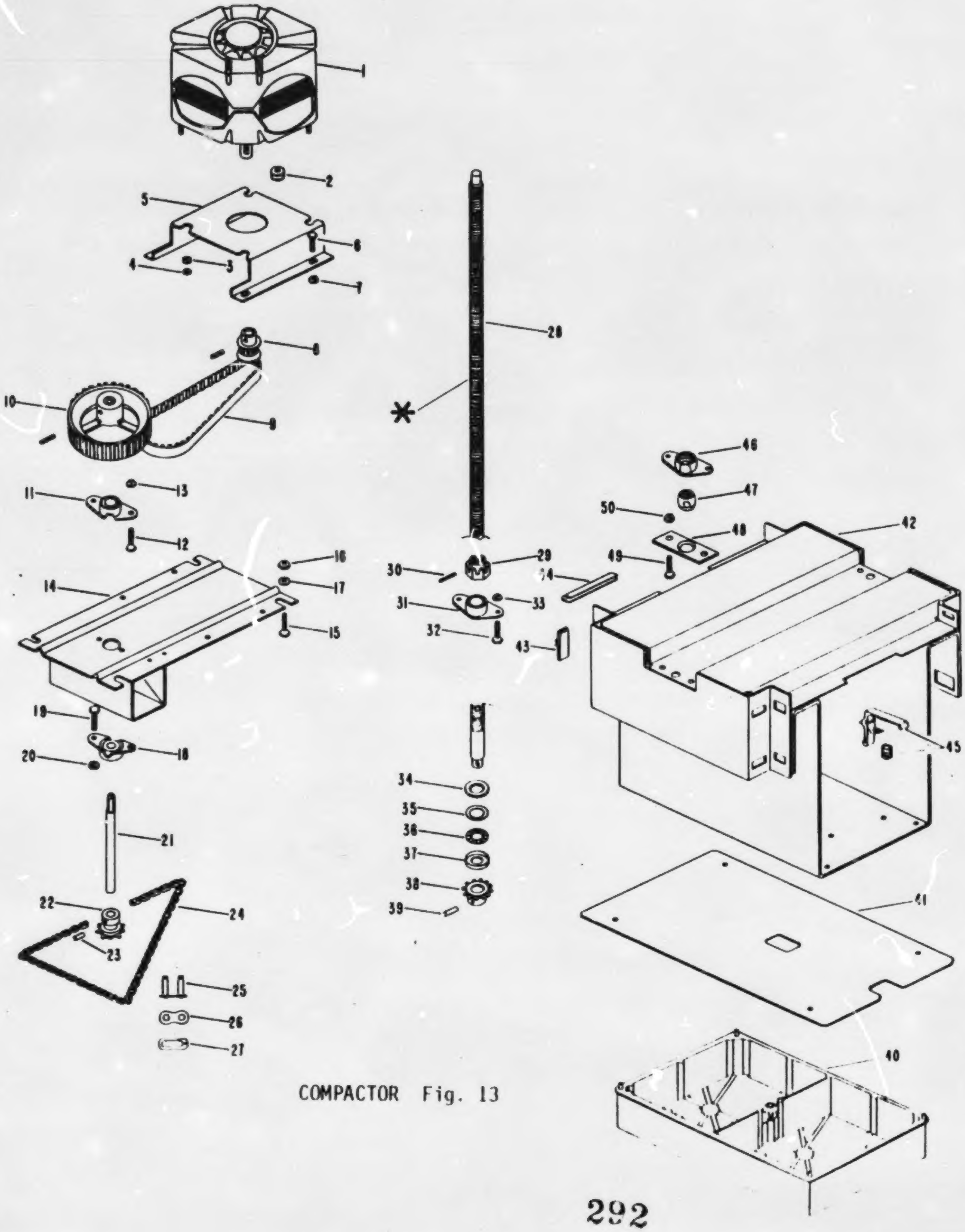
   a. 1
   b. 6
   c. 4
   d. 31

9. Identify by number (Fig. 15) the Switch Front Drawer Safety Switch on a compactor.

   a. 50
   b. 45
   c. 33
   d. 53

10. Identify by number (Fig. 15) the Limit Switch on a compactor.

    a. 53
    b. 45
    c. 33
    d. 48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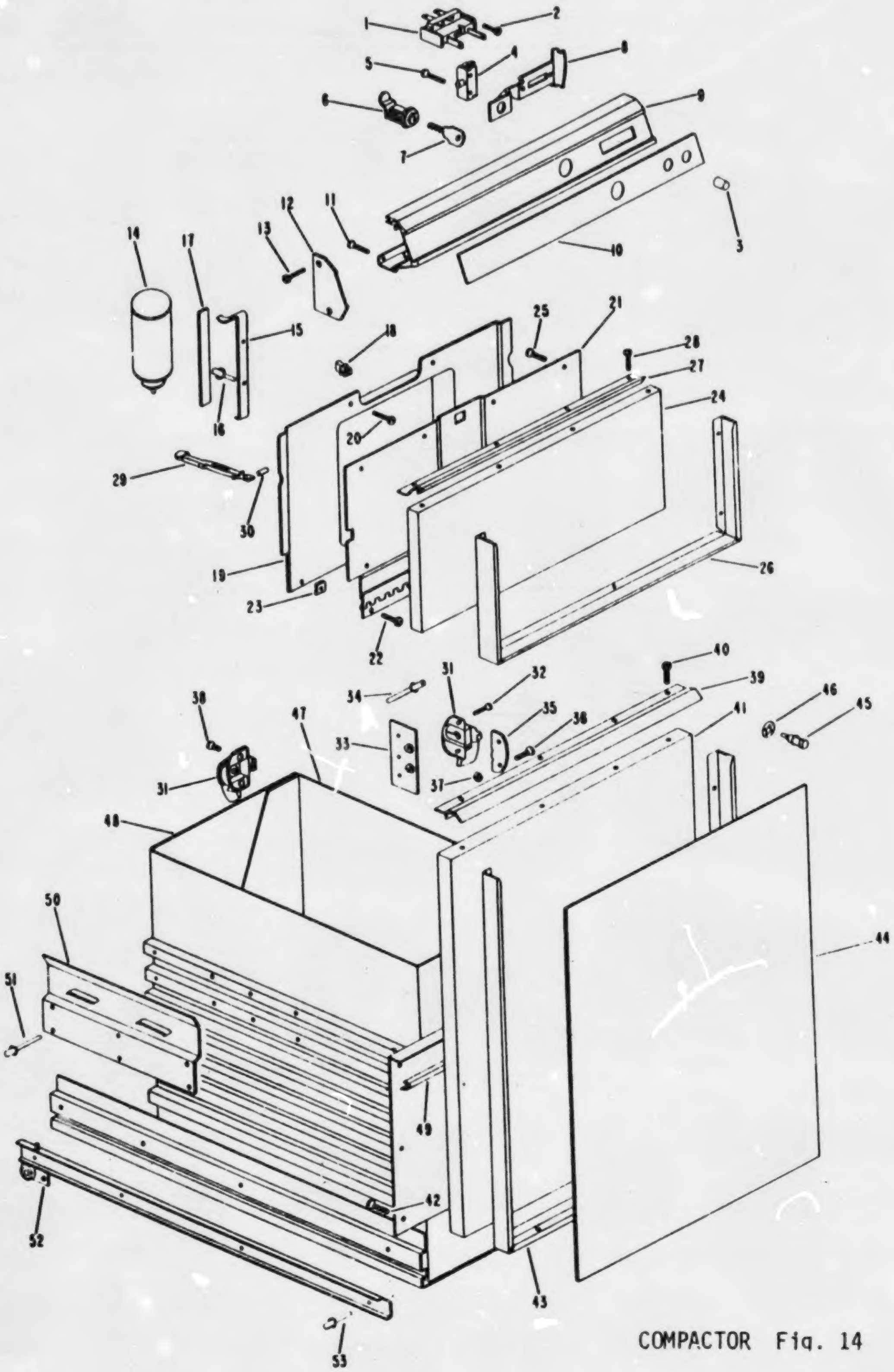
COMPACTOR Fig. 13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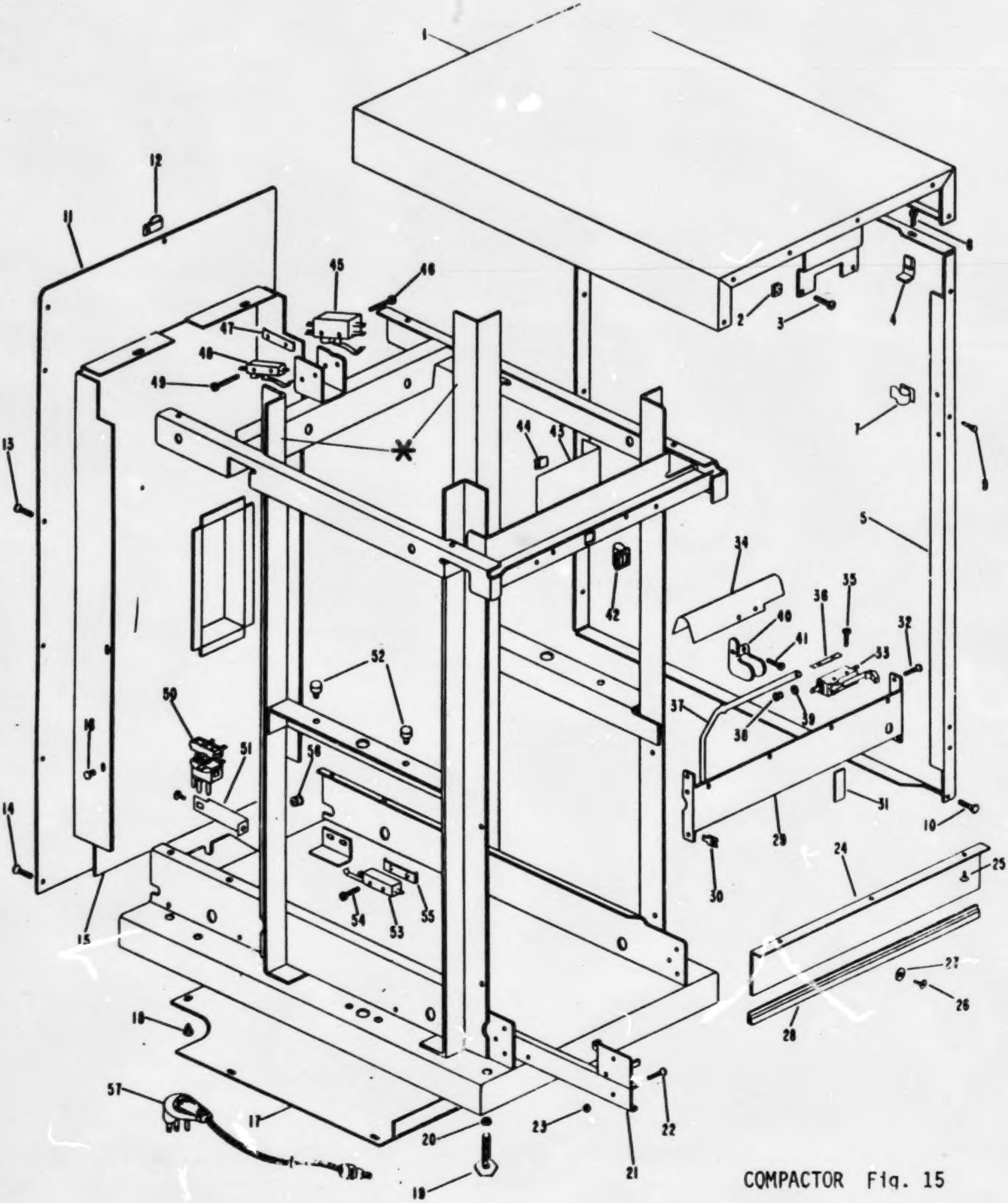
COMPACTOR Fig. 14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COMPACTOR Fig. 15

LAP TEST ANSWER KEY: DISASSEMBLY OF AN ELECTRIC COMPACTOR

1. D
2. B
3. B
4. B
5. D
6. C
7. C
8. C
9. C
10. D

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Learning Activity Package

Student: ____________________

Date: ____________________

PERFORMANCE ACTIVITY: Diagnosis of Malfunctions in an Electric Compactor

OBJECTIVE:

Diagnose malfunctions in an electric compactor following the recommended procedures and using the appropriate tools.

EVALUATION PROCEDURE:

Electrical values found during diagnosis are consistent with specification found on the manufacturer's name plate.

Successfully complete at least 80% of the items on a multiple-choice test about this LAP.

RESOURCES:

Checklist: Diagnosis of Malfunctions - Electric Compactor.
Tools, test equipment, work order form and electric compactor.
General Electric Service Manuals for the Electric Compactor Index, sections 1, 2, and 3.

PROCEDURE:

1. Follow the steps on the attached Checklist: Diagnosing Malfunctions - Electric Compactor.
2. Complete the multiple-choice test itmes for this LAP.
3. Check your answers with the test key. If your answers are all correct, record your time for completing this LAP on your SPR. If you have missed any questions, try to find out why you missed the test items. If you have any further problems, check with your instructor. When you have correctly completed all the test items, you may record your time on your SPR.

Principal Author(s): T. Ziller

CHECKLIST: DIAGNOSIS OF MALFUNCTIONS--ELECTRIC COMPACTOR

_____ 1. Complete and attach the work order form.
_____ 2. Make a thorough visual inspection of appliance.
_____ 3. Check line cords, pigtails, etc. (Ohmmeter). Resistance: _____
_____ 4. Check power switches and electrical controls (Ohmmeter). Resistance: _____
_____ 5. Check motor (Growler and Ohmmeter). Current: _____ Resistance ____
_____ 6. Check interlocks, equipment fuses and breakers (Ohmmeter). Resistance: _____
_____ 7. Check for defective motor brushes and bearings.
_____ 8. Check contacts.
_____ 9. Check relays.
_____ 10. Check gear-boxes, gears and ram shaft.

NOTE: Refer to service manual for specific equipment data.

_____ 11. Plug appliance into 115V AC 60HZ 20A source.
_____ 12. Check voltage at motor terminals (Voltmeter). Voltage: _____
_____ 13. Check current in the motor (Amprobe), Current: _____
_____ 14. Compute power dissipated by motor. Wattage: _____
_____ 15. Compare values with manufacturer's specification.

Student: ______________________________ File Code: 76.02.07.03.A2-2

Date: ______________________________ Date Published: 7/28/75

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LAP TEST: DIAGNOSIS OF MALFUNCTIONS IN AN ELECTRIC COMPACTOR

1. If the compactor motor cuts out part way through the cycle, the trouble is most probably:

   a. a defective motor; replace.
   b. an open solenoid.
   c. a defective timer switch.
   d. the overload protector.

2. If the compactor motor won't run, check:

   a. for complete, circuit on "hot" side of line through all safety switches.
   b. for open solenoid windings.
   c. gear belt slipping; replace.
   d. the motor for ground; replace.

3. If compactor won't run but hums, check:

   a. for high line voltage.
   b. for no resistance.
   c. for bad directional or starting switch on motor.
   d. for high amperage.

4. If the compactor motor runs only when the "start" button is depressed, check:

   a. for no resistance.
   b. for bad top limit switch or front door switch.
   c. for a bypass.
   d. for an open solenoid winding.

5. If compactor overload protector keeps opening, check:

   a. for shorted windings or grounds.
   b. for loose bearings.
   c. for high torque.
   d. for open line cord.

6. If compactor is not properly compacting, check for:

   a. binding solenoid plunger.
   b. jammed drive system.
   c. excessively high or low voltage.
   d. capacitor motor running at low speed; replace.

7. If the compactor fails to start, check for:

    a. rear drawer safety switch "open."
    b. open solenoid windings.
    c. shorted motor windings.
    d. a bypass.

8. If the compactor motor reverses before the ram reaches the bottom or before it compresses the trash, when there is sufficient trash in drawer, look for:

    a. ram screws too loose.
    b. jammed drive system.
    c. a slipping belt.
    d. binds in the drive system.

9. If compactor fails to cut off, check for:

    a. limit switch defective.
    b. high line voltage.
    c. high amperage.
    d. no resistance.

10. If you receive a shock from the operating compactor, check for:

    a. an open circuit.
    b. a short circuit.
    c. a faulty drawer guide switch.
    d. a shorted transformer winding.

LAP TEST ANSWER KEY: DIAGNOSIS OF MALFUNCTIONS IN AN ELECTRIC COMPACTOR

1. D
2. A
3. C
4. B
5. A
6. C
7. A
8. D
9. A
10. B

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File Code: 76.02.07.04.A2-0

Date Published: 9/29/75

Learning Activity Package

Student: ____________________

Date: ____________________

PERFORMANCE ACTIVITY: Repair, Service and Reassembly of an Electric Compactor.

OBJECTIVES:

Repair, service and reassemble an electric compactor.

Order a replacement part for the electric compactor.

EVALUATION PROCEDURE:

The appliance must operate properly.

Successfully complete at least 80% of the items on a multiple-choice test about this LAP.

RESOURCES:

Checklist: Repair, Service and Reassembly - Electric Compactor.
Test equipment, tools, appliance parts catalogs.
Electric Compactor.
General Electric Service Manuals for the Electric Compactor, Index, Sections 1-6.

PROCEDURE:

1. Follow the steps on the attached Checklist: Repair, Service and Reassembly - Electric Compactors.
2. Complete the multiple-choice test items for this LAP.
3. Check your answers with the test key. If your answers are all correct, record, your time for completing this LAP on your SPR. If you have missed any questions, try to find out why you missed the test items. If you have any further problems, check with your instructor. When you have correctly completed all the test items, you may record your time on your SPR.

Principal Author(s): T. Ziller

CHECKLIST: REPAIR, SERVICE AND REASSEMBLY--ELECTRIC COMPACTOR

Repair & Service:

_____ 1. If the power cord is faulty, replace or repair.

_____ 2. If the safety switch is faulty, replace.

CAUTION: DO NOT REPAIR

_____ 3. If any control switches are a problem, repair or replace.

_____ 4. If the connecting electrical wires are frayed, nicked, open or shorted; repair or replace with same wire gauge and color.

_____ 5. If the motor has an open, a short or is grounded; repair or replace with same type and size.

_____ 6. If the ram screws are dry, lubricate.

_____ 7. If any adjustments are necessary, proceed with a service manual.

Reassemble:

_____ 1. Install ram screw assembly.

_____ 2. Insert ram screws and adjust for proper stroke length..

_____ 3. Replace motor and connect to voltage and controls (use wire diagrams).

_____ 4. Replace access panels and mount with proper screws.

Student: ______________________ **File Code:** 76.02.07.04.A2-2

Date: ______________________ **Date Published:** 1 7/28/75

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LAP TEST: REPAIR, SERVICE AND REASSEMBLY OF AN ELECTRIC COMPACTOR

1. To check the compactor motor for ground:

    a. use an ohmmeter and check between motor housing and motor leads.
    b. use direct test motor with gear belt on.
    c. connect meter leads to ground and voltage source.
    d. connect amprobe across circuit leads.

2. If an ohmmeter is used to test a compactor motor and it indicates less than infinite resistance, this indicates:

    a. a short; replace motor leads.
    b. a ground and motor must be replaced.
    c. motor is okay, check start switch.
    d. motor housing should be calibrated.

3. The compactor drive belt is properly adjusted when a one-pound force applied deflects the belt:

    a. ½ inch.
    b. 1/8 inch.
    c. 1¼ inch.
    d. 1 inch.

4. When replacing one or both compactor drive shaft bearings, make sure that the drive shaft is installed:

    a. at a 90° right angle to the drive unit pan.
    b. in series to the drive unit pan.
    c. perpendicularly to the drive unit pan.
    d. at a 45° right angle to the drive unit pan.

5. When reinstalling the compactor shaft and drive pulley, the drive shaft end play should be set at approximately.

    a. 1/8 of an inch.
    b. ½ of an inch.
    c. 2 inches.
    d. 1/32 of an inch.

6. When reinstalling the compactor self-aligning nut into cage nut retainer, make sure that:

    a. the shorter tapered portion of nut is directed upward.
    b. the longer tapered portion of nut is directed upward.
    c. the nut is parallel to the chassis.
    d. the nut has a lock washer.

7. If compactor is blowing fuses:

   a. use a 15 AMP slo-blow type fuse.
   b. use a 15 AMP standard type fuse.
   c. use a 10 AMP standard.
   d. use the next size fuse larger than original.

8. If installing a compactor as an undercounter, what clearance must be maintained from right edge of drawer to wall or adjacent objects?

   a. 2 inches.
   b. 6 inches.
   c. 10 inches.
   d. 1 inch.

9. When installing the compactor in accordance with local electrical codes and ordinances:

   a. the electrical cord must be standard AWG size.
   b. the electrical receptacle must be a split phase type.
   c. the electrical cord must be 10 AWG in size.
   d. the electrical receptacle must be a 3-prong grounded type.

10. When installing a new safety lock on a compactor, avoid:

    a. removing lock assembly by working it out from front of control panel.
    b. removing the compactor top assembly.
    c. removing or loosening cam screws.
    d. removing the hex-shaped nut on back side of lock.

LAP TEST ANSWER KEY: REPAIR, SERVICE AND REASSEMBLY OF AN ELECTRIC COMPACTOR

1. A
2. B
3. B
4. C
5. D
6. B
7. A
8. B
9. D
10. C

Student: ____________________ File Code: 76.02.07.00.B2-2

Date: ____________________ Date Published: 7/8/75

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UNIT POST TEST: COMPACTORS

76.02.07.01.

1. The compactor operational cycle ends when the ram reaches the top and comes into contact with:

   a. unidirectional relay.
   b. the solenoid plunger.
   c. the bypass switch.
   d. the directional switch and the top limit switch.

2. What drives the compactor ram up and down the screw?

   a. a cam.
   b. pumping action caused by drive shaft.
   c. 2-self aligning cage nuts.
   d. a brush-gear.

3. What compactor mechanism releases two injections of deodorant into the trash container each time the compactor drawer is closed?

   a. bypass switch.
   b. transformer.
   c. actuator assembly.
   d. solenoid plunger.

4. What compactor device compresses the trash as it is driven down into the trash container?

   a. relay.
   b. solenoid plunger.
   c. ram.
   d. capacitor motor.

5. Name the single pole, single throw switch that functions to stop all power when the ram reaches the top of the stroke, thereby stopping the compactor.

   a. limit switch.
   b. solenoid plunger.
   c. relay switch.
   d. capacitor switch.

76.02.07.02.

6. Identify by number (Fig. 13) the Drive Shaft on a compactor.

   a. 8
   b. 28
   c. 10
   d. 21

7. Identify by number (Fig. 13) the Ram Screw Assembly on a compactor (2 per).

   a. 31
   b. 29
   c. 28
   d. 46

8. Identify by number (Fig. 15) the Reversing Switch on a compactor.

   a. 45
   b. 33
   c. 50
   d. 48

9. Identify by number (Fig. 15) the Relay on a compactor.

   a. 50
   b. 53
   c. 33
   d. 45

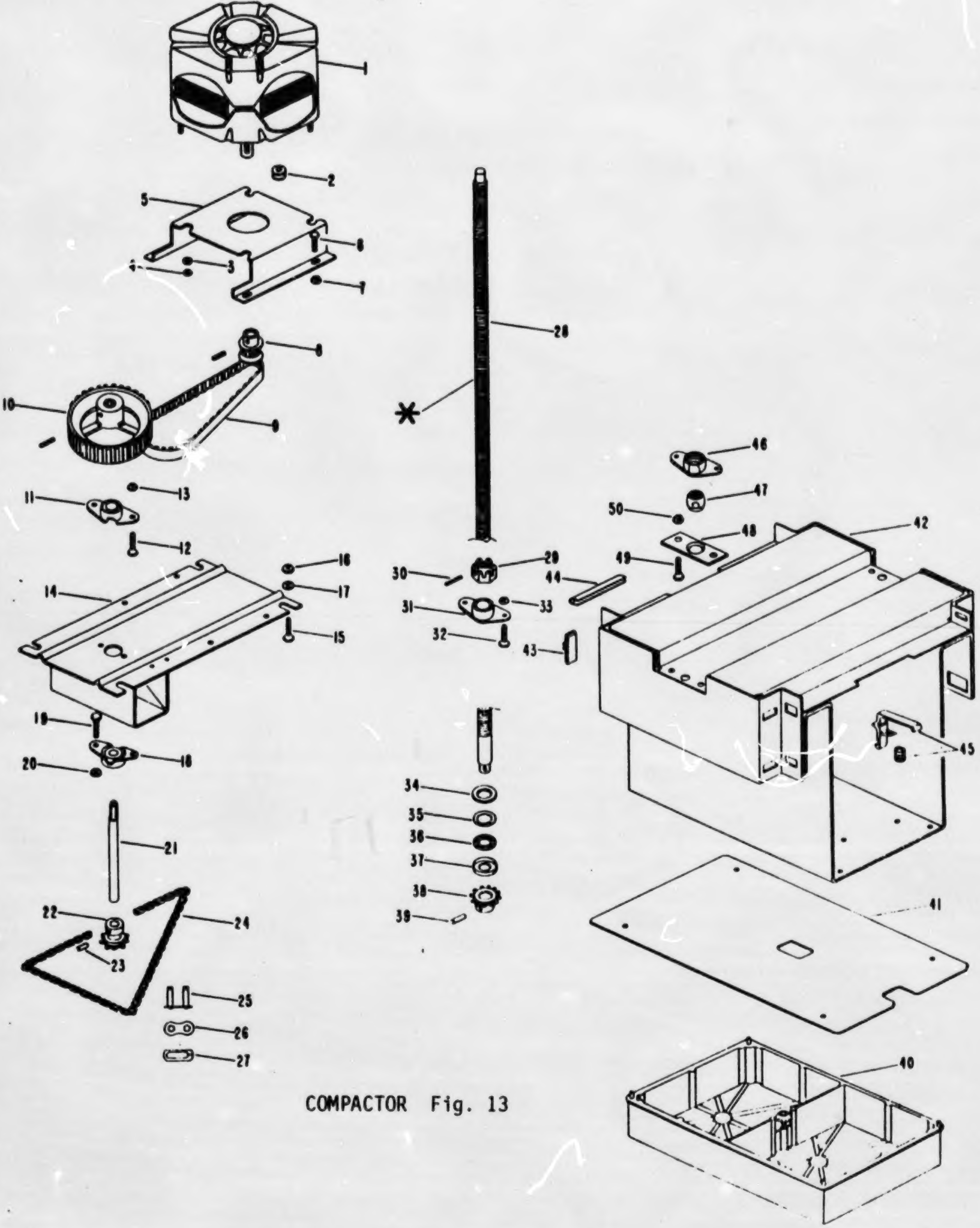
10. Identify by number (Fig. 15) the Rear Drawer Switch on a compactor.

   a. 48
   b. 33
   c. 45
   d. 53

76.02.07.03.

11. If compactor overload protector keeps opening, check:

   a. for shorted windings or grounds.
   b. for loose bearings.
   c. for high torque.
   d. for open line cord.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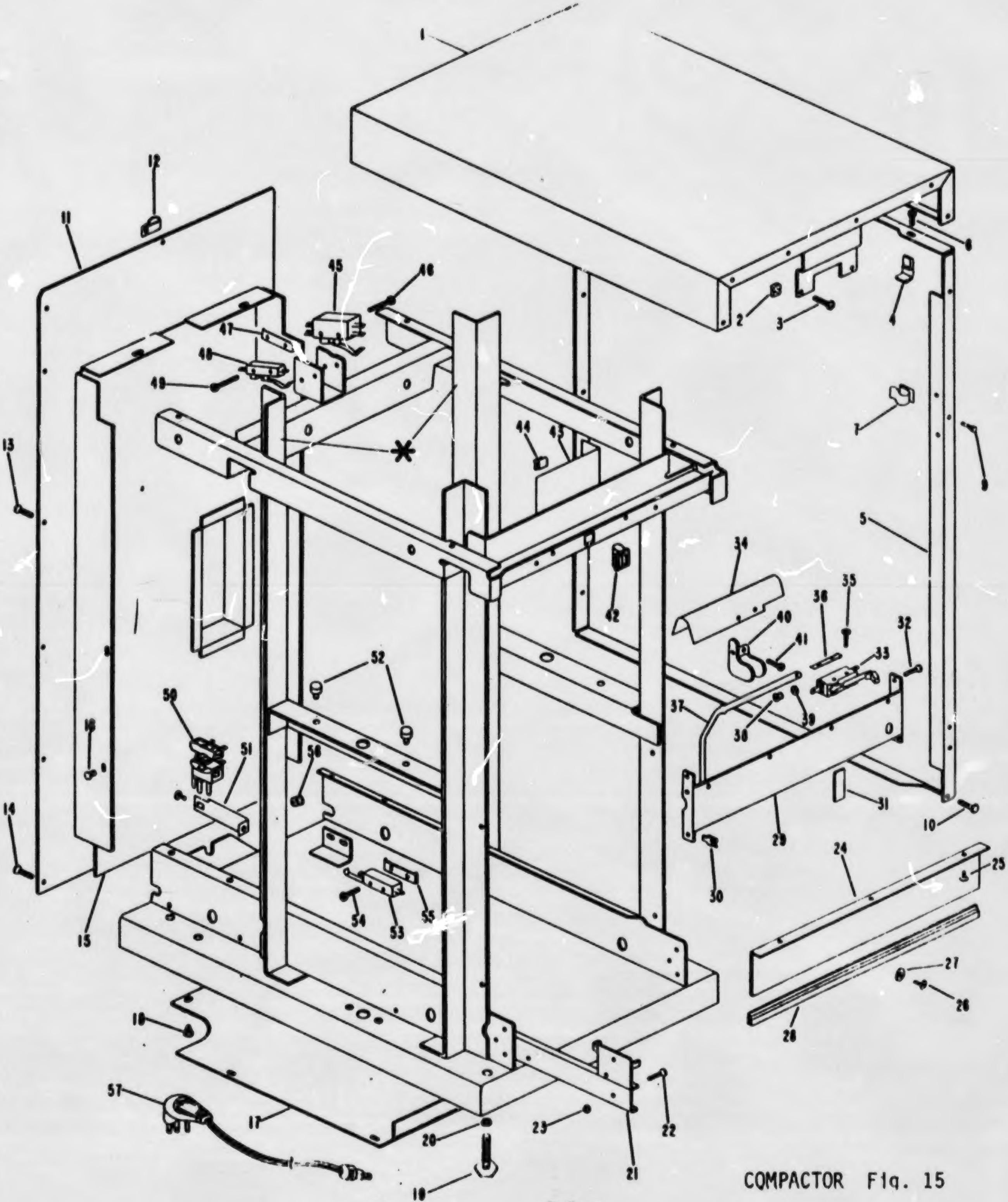
COMPACTOR Fig. 13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COMPACTOR Fig. 15

76.02.07.03. (continued)

12. If compactor starts and then stops when momentary start switch is released, check for:

    a. rear drawer safety switch "open."
    b. safety lock switch "open."
    c. defective relay.
    d. defective limit switch or front drawer safety switch.

13. If the compactor motor reverses before the ram reaches the bottom or before it compresses the trash, when there is sufficient trash in drawer, look for:

    a. ram screws too loose.
    b. jammed drive system.
    c. a slipping belt.
    d. binds in the drive system.

14. If compactor fails to reverse, look for:

    a. no resistance.
    b. "open" unidirectional switch.
    c. "open" solenoid winding.
    d. defective relay.

15. If compactor fails to cut off, check for:

    a. limit switch defective.
    b. high line voltage.
    c. high amperage.
    d. no resistance.

76.02.07.04.

16. When installing the compactor motor gear pulley on the shaft, position the pulley:

    a. 1 inch up from bottom bracket.
    b. ½ inch down from bottom bracket.
    c. 1½ inch down from bottom bracket.
    d. ¼ inch up from bottom bracket.

17. For proper operation, the compactor drive chain should not deflect more than:

    a. ¼ inch with a one pound force applied.
    b. 1 inch with a one pound force applied.
    c. 1½ inch with a one pound force applied.
    d. 1¼ inch with a one pound force applied.

76.02.07.04. (continued)

18. Test a compactor centrifugal switch mechanism on the motor by:

    a. using a voltmeter.
    b. using a test lamp.
    c. using an ohmmeter.
    d. pressing against the actuator lever protruding from the motor.

19. If compactor is blowing fuses:

    a. use a 15 AMP slo-blow type fuse.
    b. use a 15 AMP standard type fuse.
    c. use a 10 AMP standard.
    d. use the next size fuse larger than original.

20. If a compactor requires electrical or other service involving contact or near contact with electric wires:

    a. use a voltmeter probe.
    b. turn over on its back to service.
    c. use an amprobe.
    d. obtain a service manual.

UNIT TEST ANSWER SHEET

POST TEST

Occupational Area: ______
File Code: 76.02.07.00.B2-2
Name: ______

ANSWERS

LAP 01	1.	D	21.		41.	
	2.	C	22.		42.	
	3.	C	23.		43.	
	4.	C	24.		44.	
	5.	A	25.		45.	
LAP 02	6.	D	26.		46.	
	7.	C	27.		47.	
	8.	A	28.		48.	
	9.	A	29.		49.	
	10.	D	30.		50.	
LAP 03	11.	A	31.		51.	
	12.	D	32.		52.	
	13.	D	33.		53.	
	14.	D	34.		54.	
	15.	A	35.		55.	
LAP 04	16.	B	36.		56.	
	17.	A	37.		57.	
	18.	D	38.		58.	
	19.	A	39.		59.	
	20.	D	40.		60.	

Student: ____________ File Code: 76.02.07.00.A1-5

Date: ____________ Date Published: 11/14/74

Mountain-Plains Education &
Economic Development
Program, Inc.
Glasgow AFB, Montana 59231

Family Pay Number: ________ Sex: M F (Circle 1)

UNIT PERFORMANCE TEST: COMPACTORS

OBJECTIVE 1:

Given a malfunctioning electric compactor, the student will service and repair the compactor so that it functions according to the manufacturer's specifications, following safe practices and procedures.

OBJECTIVE 2:

Using appropriate tools and test equipment, the student will calculate and record amperage, voltage, resistance, and wattage of an electric compactor.

TASK:

The student will service and repair a malfunctioning electric compactor and, in the process, he will take and record amperage, voltage, resistance and wattage readings, using appropriate test equipment.

ASSIGNMENT:

CONDITIONS:

The student will be given a malfunctioning electric compactor (it may be bugged by the instructor or it may be one brought in by a customer). He will be required to service and repair the compactor in conditions similar to those in a typical appliance repair shop. He will be allowed to use any and all tools, equipment, service manuals, text books, etc., commonly found in a repair shop. He must complete it in a reasonable length of time with no assistance from the instructor(s) or students.

RESOURCES:

Tools:

Amprobe RS-3 Rotary Meter (B-A)
Soldering gun 100 to 140 watt
Adjustable Wrench
Nut Driver Set
Long Nose Pliers
Diagonal Cutters
Slip Joint Pliers
Screwdriver Set
Phillips Set
Hex & Spline Wrench Kit
Vise Grip Plier Model Size 7"
Utica Electrician's Knife, Standard Size
18" Aluminum Level
12' Steel Tape
Punch & Chisel Set, 1/2", 5/8" chisels; 3/16, 3/8, 5/32 punches
Combination Wrench Set
Hammer (Ball Peen) 12 oz.
10" Channel-lock Plier
Utility Box
VOM
Assortment of wire, fasteners and repair parts
Compactor

Printed Material:

Various Repair Manuals
Manufacturer's Specification Sheets

Student: ____________________ File Code: 76.02.07.00.A1-5

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PERFORMANCE CHECKLIST:

OVERALL PERFORMANCE: Satisfactory_____ Unsatisfactory_____

	CRITERION Met	CRITERION Not Met
Objective 1:		
1. Follows safe practices and procedures.		
Criterion: No injury results to the student or the equipment and		
complies with OSHA requirements.		
2. Follows proper procedures for disassembly.		
Criterion: No damage results to the appliance.		
3. Diagnosis and troubleshoots malfunctions properly.		
Criterion: When repaired, the appliance functions according		
to the manufacturer's specifications.		
4. Reassembles the appliance properly.		
Criterion: Appliance functions according to the manufacturer's		
specifications and the procedures followed agree with		
those described in the service literature.		
5. The repaired appliance is repaired in a neat,		
professional manner.		

(Checklist continued)

	CRITERION	
	Met	Not Met
Criterion: No damage results to the appliance such as scratches and dents.		
6. All connections and fastenings are properly completed.		
Criterion: The appliance connection complies with the manufacturer's specifications. The connection is mechancally fastened and structurally sound. The connection is electrically fastened and free of defects.		
7. Appliance functions according to the manufacturer's specifications.		
Criterion: Manufacturer's specifications.		
8. Uses appropriate repair part and supplies.		
Criterion: They match exactly those listed in the manufacturer's specifications.		
Objective 2:		
9. Uses test equipment properly.		
Criterion: Manufacturer's specifications.		
10. Wattage readings are accurate.		
Criterion: Manufacturer's specifications.		
11. Voltage readings are accurate.		
Criterion: Manufacturer's specifications		
12. Amperage readings are accurate.		